Heating and Ventilating

For Engineers and Contractors Controlling the Design, Specification, Installation and Maintenance of Heating, Ventilating and Air Conditioning

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CONTENTS

Ventilating and Heating Modern Farm Buildings ..... *A. J. Offner* 17
Metallic Wall Paper for Conserving Heat 20
Utility Cools with Well Water and Refrigeration 21
Metallic Heat Insulation ..... *E. R. Queer* 22
Fuel War Wages Furiously 27
Free Service for Equipment Buyers 28
Modernizing Section 29
Chicago's Newest Technical High School Teaches Air Conditioning 38
NRA Gets New Lease on Life; Codes Rationalized 40
Who's Who in the Heating Contractors Code Authority 41
Field Tests Show Accuracy of Degree-Day Method ..... *R. C. Broach* 42
District Heating in Paris 45
Coal Selection, Capacity Checking, and Installation Hints for Small Heating Stokers ..... *D. Landau* 46

DEPARTMENTS

Editorials 49
Abstracts 50
Reference Data, 37-A and 38-A, Combustion Data—Coal ..... Opposite 50
News of the Month 51
Picture Paragraphs 56
New Equipment 61
The Weather for August, 1934 64
New Catalogs 69

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Ventilating and Heating of a Modern Farm Building Group

By ALFRED J. OFFNER, M.E.†

TO ONE not entirely familiar with modern farm barn building practice, such a structure would quite often be visualized as being nothing more than an unheated, drafty, damp, and foul-smelling building. With such thoughts, quite naturally the question might arise, why ventilate such buildings?—why heat them?

Exhaustive and painstaking research, experimentation, and study in animal husbandry, in relation to farm animals and poultry, by Departments of Agriculture, both National and State, and by agricultural societies and engineers, have long ago outlawed the old, cold, damp, and unventilated farm barn or poultry house. Not only the health of the animals housed, but their economical upkeep and the quantity and quality of their products demand, in addition to proper food and water, sanitary, healthful, and comfortable living quarters. Therefore, the application and use of modern knowledge and experience as developed by agricultural experts in the construction, ventilation, and warming of farm buildings, and the application of such data by a non-agricultural engineer to such buildings recently erected and now in use, should be of interest.

†Consulting Engineer, New York.

The Buildings

The buildings forming the basis of this article are not commercial farm buildings, but are of a private nature, and have been completed and in actual use over a year. They are used for housing cows and horses. In addition to the cow barns and horse stables to be described, there are a dairy building, an animal hospital building, an administration building, a large hay barn, two silos, a manure shed, garage, and wagon sheds. The group is located in what is known as Zone No. 2, as determined by and indicated on the standard map of Climatic Zones of the United States prepared by the United States Department of Agriculture. This zone extends, roughly, between Lake Erie and the

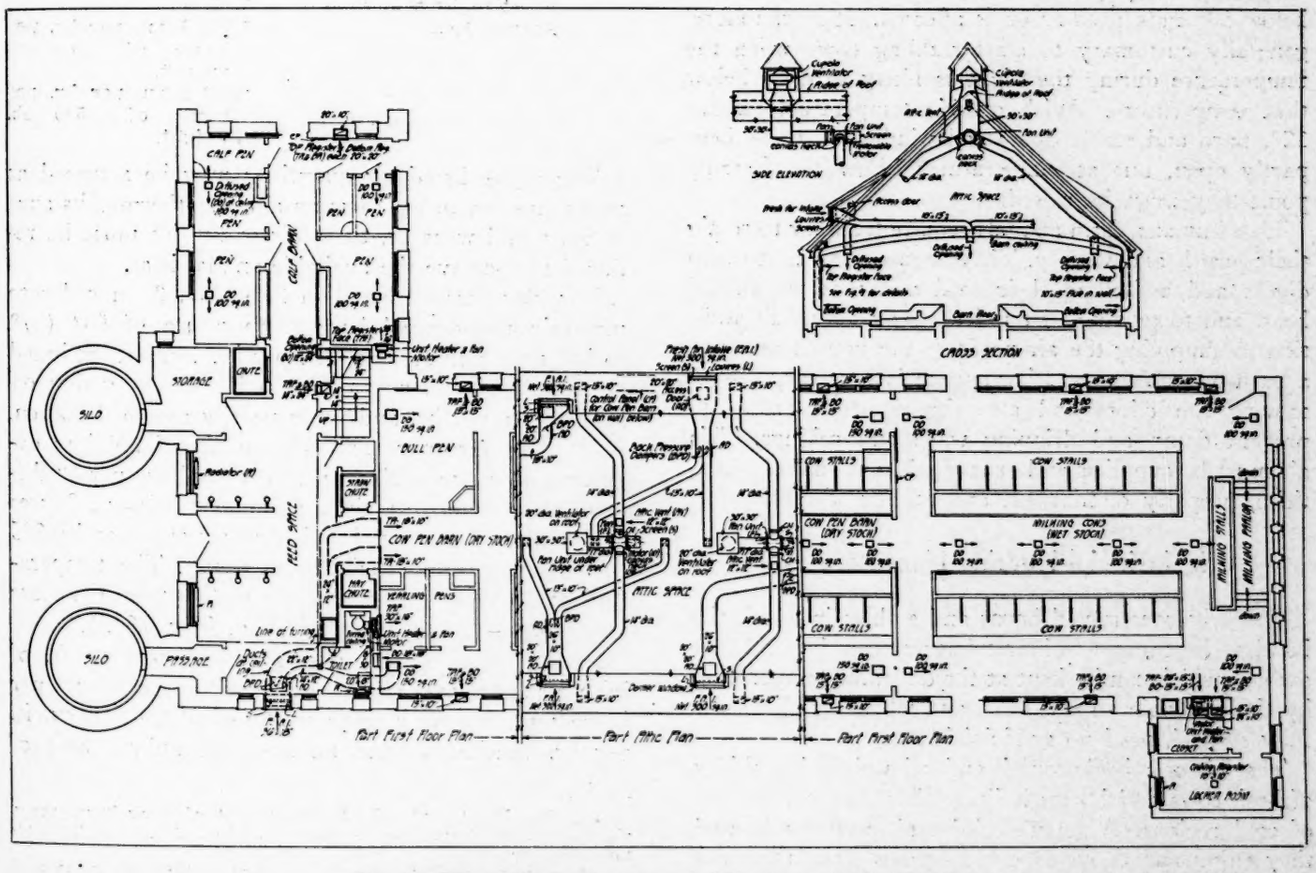


Fig. 1. Floor plan and cross section of cow barn building

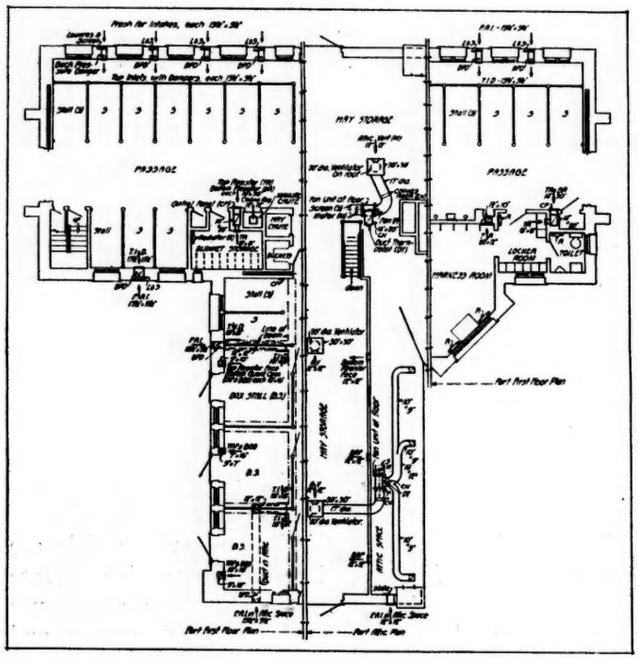


Fig. 2. Floor plan of horse stable building

southern boundary of Pennsylvania and Ohio, from the Atlantic coast westward. The buildings are all of fireproof construction, the walls being of stone, detailed construction of which will be described later.

Why Ventilate?

Modern dairy practice shows that at temperatures below 50° milk production is affected. It is, therefore, generally customary to start stabling cows when the temperature during the night is likely to drop below that temperature. With outside temperatures above 32°, barn and stable doors and windows may be kept partly open, but at temperatures below the freezing point they must be closed.

Like humans, farm animals require fresh air to retain their health and vitality. They require this air to help digest and assimilate their food and produce animal heat, and to repair and build up body tissue. In addition to supplying the air needs of the housed animals, a barn or stable ventilating system is necessary for removing the odors and also the moisture, so as to prevent damp and dripping walls and ceilings. This air must be supplied and exhausted in abundant quantities, properly distributed, and without drafts.

Is Artificial Heating Necessary?

Properly constructed barns and stables in which the building heat losses and air cubage are not beyond that amount which can be kept at the desirable temperature by the available animal heat, and which buildings are fully stabled, need no artificial heating.

The historic background and climatic adaptability of both cows and horses indicate that they are natives of cold regions. When well fed and properly housed they enjoy and thrive in cold climates. It is therefore not necessary to have cow barns and horse stables warm. In the former, the minimum temperature should not be lower than that at which milk production is affected, while in the latter it should be above the freezing point, not only to prevent water from freezing, but also to make the stables more comfortable to work in. Stables holding riding horses that are clipped and well groomed require a somewhat higher temperature.

Design Data

The design data[1], based on the buildings being located in Zone No. 2, and which data were used in the design of the ventilating and heating systems, are as follows:

General		
Low outside temperature		**0°**
Daily mean temperature at 8 a.m., January and February.		**17°**
Cow Barns		
Ventilation		**3,175 cu. ft. per hr. per cow.**
Temperature	**Cow Barn**	**50°**
	Calf Barn	**60°**
	Hospital	**60°**
Relative Humidity		**85%**
Animal Heat		**3,000 B.t.u. per hr. per cow of 1,000 lb. weight**
		1,800 B.t.u. per hr. per heifer of 500 lb. weight
		1,000 B.t.u. per hr. per calf averaging 6 months in age
Stabling Days		**250 per year.**
Horse Stables		
Ventilation		**4,000 cu. ft. per hr. per horse.**
Temperature	**Stall Stable**	**35°**
	Box Stalls	**40°**
Relative Humidity		**85%**
Animal Heat		**1,800 B.t.u. per hr. per horse of 1,000 lb. weight.**
		2,500 B.t.u. per hr. per horse of 1,500 lb. weight.

The above listed air quantities may be assumed as maximum. In order to maintain the thermal balance in very cold weather, these air quantities must be reduced to conserve the available animal heat.

For cow barns located in Zone No. 2, in order to maintain the desired barn temperature of 50° (17° to 50° rise) and 3,175 cu. ft. per hr. ventilation, based on a unit of one cow of 1,000 lb. weight giving off 3,000 B.t.u. per hr. and the generally assumed 600 cu. ft. of barn air space and 130 sq. ft. of building exposure, the permissible heat losses per hour per 1° difference, in order to maintain the heat balance, figures as 0.051 B.t.u. per cu. ft. of barn air space and 0.235 B.t.u. per sq. ft. of building exposure. The temperature control index[2] per cow unit in this zone therefore must not exceed 30 B.t.u. (130 sq. ft. x 0.235).

In the horse stables, also based on 600 cu. ft. of barn air space and 130 sq. ft. of building exposure per horse unit, but on a temperature of 35°, 4,000 cu. ft. per hr. ventilation, and an available animal heat of

[1]Technical Bulletin 187, U. S. Department of Agriculture, 1930: also "Cow Barn Ventilation," by Alfred J. Offner, A.S.H.V.E. Transactions, Vol. 39, 1933.

[2]"A Temperature Control Index in Dairy Stable Standardization," by James L. Strahan, *Agricultural Engineering*, October, 1932.

2,500 B.t.u. per hr. (1,500 lb. horse), the permissible heat losses per hour per 1° difference to maintain the heat balance in this case figures as 0.212 B.t.u. per cu. ft., and 0.484 B.t.u. per sq. ft. The temperature control index is then 63 B.t.u.

We will now proceed and see how this design data and theory can actually be applied to the problem on hand.

The Cow Barn Building

The cow barn building, as illustrated by Fig. 1, in addition to the usual feed and utility rooms, consists of three barns: the milking cow barn (wet stock), cow pen barn (dry stock), and the calf barn. The dairy building adjoins the milking cow barn, and the animal hospital building adjoins the calf barn. There are no direct connections between these two buildings and the cow barn proper.

The Milking Cow Barn

The milking cow barn (wet stock) is a room 38 ft. wide, 47 ft. long, and 9 ft. high (average) having a cubage of 16,074 cu. ft. In addition to the milking parlor, there are stalls for 18 cows. The barn air cubage to be maintained at proper temperature by the heat produced by one cow is then 893 cu. ft., which is greater than the 600 cu. ft. air cubage generally assumed. Based on a barn temperature of 50° and a mean outside temperature of 17°, the heat transmission losses through the exposed parts of the barn, such as windows, walls, and ceiling, figure as 33,900 B.t.u. per hr., or 1,884 B.t.u. per one cow unit.

Based on the maximum ventilation of 3,175 cu. ft of air per hour per cow, to heat this air from 17° to 50° would require 1,991 B.t.u., making the total heat loss per cow unit as 3,875 B.t.u. (heating, 1,884; ventilation, 1,991) or 875 B.t.u. in excess of the 3,000 B.t.u. animal heat produced and available from an average cow. This condition calls for the addition of artificial heat, and is exactly what the design provides for and as has been installed. With lower outside temperatures than the mean assumed, or when the barn is not fully stabled, the amount of ventilation is to be reduced.

Based on the actual barn cubage in this case, namely 893 cu. ft. per cow, the heat losses per hour per 1° difference figures as: 0.065 B.t.u. per cu. ft., and 0.205 B.t.u. per sq. ft. of building exposure. The temperature control index comes to 57.5 B.t.u. These figures are in excess of that allowed by the design data, and again indicate that artificial heating is required.

The Cow Pen Barn

The cow pen barn (dry stock) is 38 ft. wide, 64 ft. long, and 9 ft. high, or a cubage of 21,888 cu. ft. This barn has 10 stalls and 7 pens, therefore space for a total of 17 cows. The barn cubage per animal amounts to 1,287 cu. ft. The heat transmission losses through the structure for a 33° rise are 38,100 B.t.u. per hr., or 2,241 B.t.u. per one cow unit. This figure indicates that here also artificial heating is required, and which heat has been provided for.

The Calf Barn

The calf barn is 24 ft. wide, 26 ft. long, and 8 ft. high, a cubage of 4,992 cu. ft. While there are only six pens in this barn, the number of calves that can be housed is of course considerably more than this number. The heat transmission losses from this room are 18,600 B.t.u. per hr., based on heating this barn from 17° to 60°. Artificial heating is here also indicated and provided for.

The Horse Stable Building

The horse stable building, as illustrated by Fig. 2, in addition to the usual feed, harness, and utility rooms, has two stables, one having stalls, the other box stalls. No artificial heating is provided for in this building.

The Stall Stable

The stall stable is approximately 23 ft. wide by 82 ft. long, and 10 ft. high, with an actual cubage of 20,200 cu. ft. There are 17 stalls. The heat transmission losses, based on 35° with a mean outside temperature of 17°, figures as 21,600 B.t.u. per hr., or 1,270 B.t.u. per one horse unit.

Based on the maximum ventilation of 4,000 cu. ft. of air per hour per horse, to heat this air from 17° to 35° would require 1,368 B.t.u., making the total heat loss per horse unit as 2,638 B.t.u. (heating, 1,270; ventilation, 1,368). This is approximately equal to the animal heat available from one 1,500-lb. horse. In cold weather, the amount of ventilation must be curtailed or the horses blanketed.

The Heating Systems

The buildings which require warmth are all heated by a vacuum steam heating system. For ease in maintenance and cleaning, all radiators are hung on the

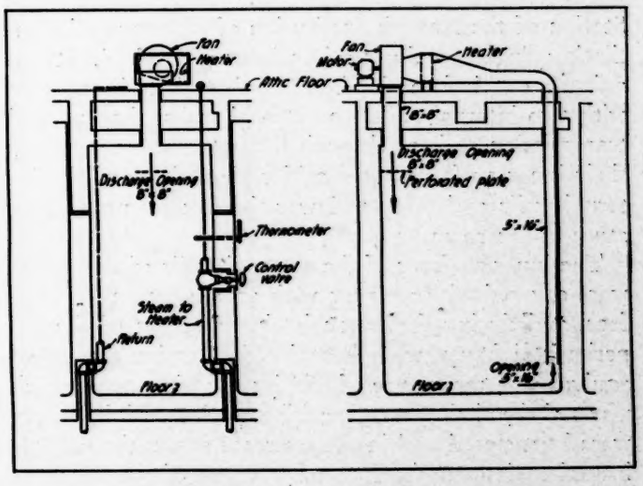


Fig. 3. Method of heating sterilizer room

walls with radiator connections above the floors. The boilers are oil fired, and are of the return tubular type, two being low pressure for heating and the third a medium pressure boiler operating at 60 lb. steam pressure, which pressure is required for the dairy equipment and the heating of the sterilizer room.

Heating of Sterilizer Room

The sterilizer room, which is located in the dairy building, is used for sterilizing, by means of dry heat, equipment used in the dairy, such as milk pails, milk bottles, etc. This requires an air temperature of 210° to 220°. This room is heated by means of recirculation of the room air, as shown in detail by Fig. 3, the heating medium being medium pressure steam. The starting and stopping of the fan, the control of the heat by hand, and the inside air temperature, may all be controlled and observed from the outside of the room. The heating unit is further under automatic control, actuated by a bulb located in the sterilizer room and controlling a thermostatic valve in the steam supply line located at the ceiling of the boiler room below.

Air Heating for the Cow Barns

In order to prevent the cow barns from becoming too cold in severe weather, due to the fact that they either cannot be kept at proper temperature by the available animal heat or in cases where the barns are not fully stabled, means for artificially tempering the barn air has been provided for.

The heating is provided for by the recirculation of the barn air through fin-type unit heaters, warmed by low-pressure steam, the steam supply being either under hand or automatic control. The air is circulated by means of electrically-driven fans of the propeller type. Fig. 4 shows a section through a typical unit heater, with air inlet and air outlet connections. Only one unit is provided for each of the three barns.

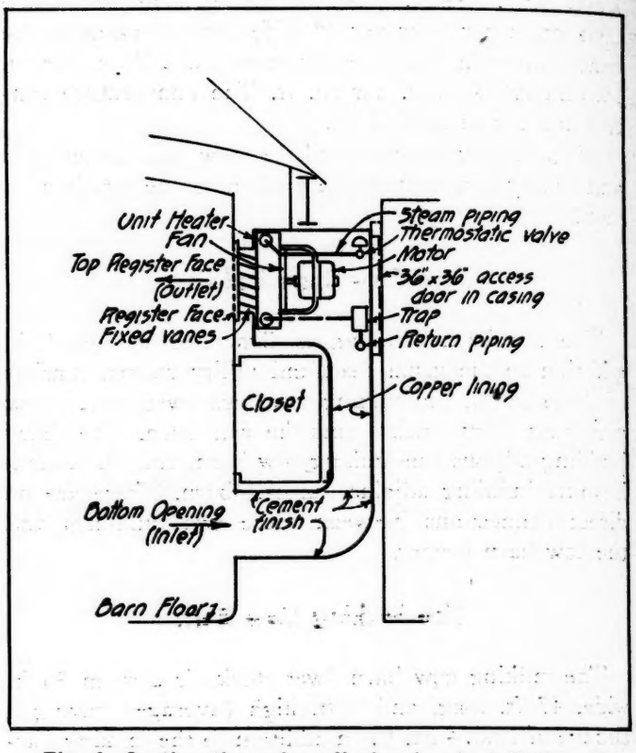


Fig. 4. Section through wall showing installation of unit heater

No means of artificial heating has been provided for in the horse stables.

(To be concluded in an early issue)

Metallic Wall Paper for Conserving Heat

THE possibility of papering the external walls of a room with metal foil with the idea of conserving heat and at the same time providing a greater feeling of warmth was investigated by the Building Research Station of the English Institution of Heating and Ventilating Engineers during the winter of 1933-34. It was pointed out before the investigation that, in a room with two internal and two external walls, the outward transmission of heat through the external walls causes their inner surfaces to be colder than those of the internal walls and tends to lower the equivalent temperature in the room.

The inner surfaces of the external walls of the rooms were covered with a paper with an aluminum foil surface, and during the past winter the rooms of the experimental house were kept by day and night at an equivalent temperature of 65° by electric stoves which warmed the air in the rooms. The windows of the rooms were kept closed and in the staircase annex the air was heated and maintained at an average of the air temperatures in the four rooms of the house. The daily heat supply to each room from 9.30 a.m. to 9.30 a.m. was measured.

The experiment showed that the use of metallic wall paper resulted in a saving of heat amounting to 8%.

The experiment was not carried out with the view to advocating the use of metallic wall paper but merely in order to confirm a suggestion made upon theoretical grounds and to illustrate the influence of the temperature and nature of the wall surfaces upon the equivalent temperature of the room.

It may perhaps be mentioned that if it were desired to use a metallic wall paper in this manner it would be possible to obtain uniformity of appearance by papering all the walls of a room, and, while retaining the sight of the metal foil upon the inner walls, to diminish its reflecting power for radiant heat by a coating of lacquer. It will be remembered that Leslie found that a lacquer coating one-thousandth of an inch thick diminished the reflecting power of a tin mirror to one-fifth of its original value.—*Journal of the Institution of Heating and Ventilating Engineers, London.*

Utility Cools with Well Water and Refrigeration

A COMBINATION of deep well water and electric refrigeration is used to keep three floors of the Hartford Electric Company's office building cool and comfortable. The apparatus is so arranged that the water from a 600-ft. well provides the initial cooling and two freon compressors the final cooling. The refrigerating effect from the well water is approximately 18 tons.

The present air conditioning apparatus utilizes the original ventilating apparatus which was installed when the building was built in 1914. The system consisted of a spray washer, with a 20,000 c.f.m. capacity, for cleaning the air, a 54-in. multivane fan, and the necessary ductwork. In the original apparatus no provision was made for cooling or dehumidifying the air.

When it was decided to convert the ventilating system into a complete air conditioning system the 600-ft. well, which was drilled 35 years ago, but out of use for some time, was restored to service. The water is raised to a cistern by means of an air lift, providing a constant supply of 55 g.p.m. at 60°.

The well water is pumped through a fin coil with 3,600 sq. ft. of surface which furnishes the initial cooling to the air. The temperature of the water is raised at this point about 8°. This is known as the primary cooling stage and at 80° or higher, the air is cooled 9°. The cooling effect in this stage is approximately 18 tons. After leaving the primary stage the water flows through the refrigerator condenser where it liquefies the compressed freon. The water has a temperature of 90° when it leaves the condenser. It is then discharged into a sewer.

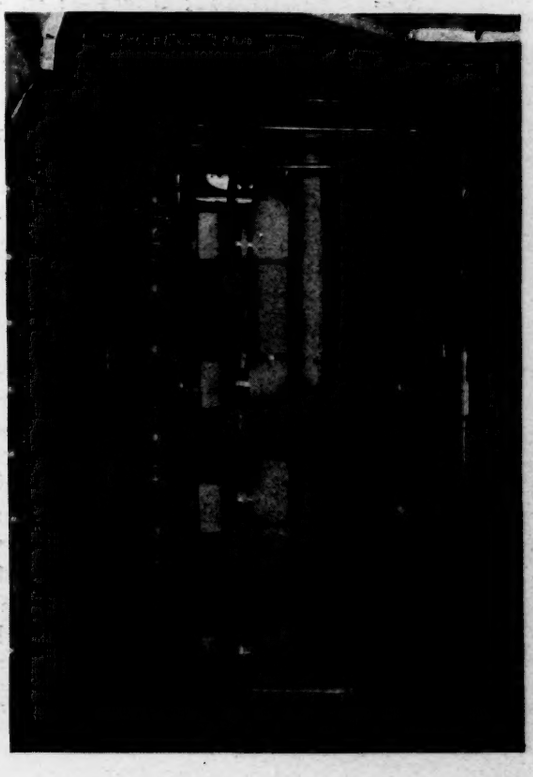
The final stage of cooling and dehumidification is by mechanical refrigeration of the direct expansion type, using freon as a refrigerant. The convector for this direct expansion system is located in the air stream and consists of approximately 4,000 sq. ft. of fin type cooling surface in four sections. Each section is controlled by its own expansion valves and a liquid solenoid valve. The solenoid valves are controlled by a thermostat located in the display room on the first floor.

The refrigerating apparatus consists of two 35-ton freon compressors, each belt driven by a 20-40 hp. two-speed motor. These two compressors together with the refrigerant condenser and the control and instrument board are located in an extremely neat and well balanced apparatus room.

All of the air is cleaned by passing it through glass filters before it enters the cooling and dehumidifying apparatus. The conditioned air leaves the fan at 62°-68° and is introduced into the larger offices through special high velocity grilles. A temperature differential of 10° is usually maintained between inside and outside conditions.

In actual operation, when the outside temperature was 91° and the relative humidity 76%, approximately 36 grains of water were taken from each pound of air per minute. This amounted to 7.5 lb. of water per minute or 60 gal. per hr.

(Right) Expansion valves which control the flow of the refrigerant through the cooling coils. (Below) Air conditioning apparatus room in the office building of the Hartford Electric Company.



Metallic Heat Insulation

By E. R. QUEER†

THIN sheets of polished metals when facing air spaces offer considerable resistance to heat flow across the air spaces. Although this phenomenon has been known for many years it was not until 1927[1] that Schmidt revived interest in it by employing very thin sheets of bright aluminum for insulation. During the last few years the usefulness and ability of bright metallic surfaces to serve as effective heat resistance has been established. Although the theory of thermal radiation, which forms the basis of metallic heat insulation, has been available for quite a long time, the engineer has had a limited training in its principles. On this account much confusion seems to be prevalent regarding radiation and an attempt will be made to clarify some of the misunderstanding. Along with a brief review of the theory of radiation some new heat transfer data and emissivities involving metallic surfaces are presented.

The Stefan-Boltzmann Law for thermal radiation states that energy emitted by a black body is proportional to a constant times the absolute temperature raised to the fourth power. For the purpose of radiant heat transfer calculations the law is expressed in the form of a modified equation.

$$qr/A = 0.174 \frac{\left[\left(\frac{T_1}{100}\right)^4 - \left(\frac{T_2}{100}\right)^4\right]}{n+1} Fa\ Fe \qquad (1)$$

qr = radiant heat transferred—B.t.u. per hr.
A = area of radiating surface—sq. ft.
T_1 = hot surface temperature—°F. abs.
T_2 = cold surface temperature—°F. abs.
0.174 = black body radiation constant—B.t.u. per sq. ft. per hr. per °temperature difference of 4th power of abs. temp.
Fa = angle factor = 1 for infinitely large parallel planes spaced close together.
Fe = emissivity factor = $\dfrac{1}{\frac{1}{p_1} + \frac{1}{p_2} - 1}$
p_1 = emissivity = absorptivity of hot surface
p_2 = emissivity = absorptivity of cold surface
n = number of screens in air space
(n + 1) = screening factor or number of air spaces.

Since emissivity and absorptivity sometimes cause confusion, the factors influencing them will be considered. By definition, the emissivity of a surface is the ratio of its emissive power to that of a perfect radiator or black body. The absorptivity and emissivity are pure numerics and by Kirchoff's Law they are found to be equal. In nature we have no substance that produces perfect emission or absorption, therefore, the emissivity and absorptivity of all substances will be less than 1. These quantities depend on the wave length of the emitted or impinging radiation, temperature, and nature of the surface of the substance involved. To illustrate, suppose the filament of a 100 watt vacuum tungsten lamp is heated gradually from 70° to 4500°, it will emit radiations all along this temperature range. The maximum energy emitted at each temperature will increase and occur at progressively shorter wave lengths. Up to 750° all the radiation is confined to the infra-red or heat band whose wave length extends from 0.030 cm. to 0.00000076 cm. in the spectrum. At 750° light in the form of a red glow appears. From 750° to 4500° the white light spectrum is produced and it ranges in wave length from 0.00000076 cm. to 0.00000038 cm. At the maximum temperature approximately 8% of the total heat energy in the filament is conducted away along the leads, 86% is radiated as infra-red rays, and 6% is light radiation. All absorbers or emitters of radiant energy exhibit selectiveness to certain wave lengths. If individual or monochromatic wave lengths from the high temperature tungsten are allowed to impinge normal to a brightly polished high grade steel surface, 44% of the incident 0.00000050 cm. wave length (light radiation) will be absorbed; whereas only 7% of the 0.0000090 cm. wave length (infra red) is absorbed.[8] The color of steel is blue grey and it absorbs quite uniformly all colors in the white light spectrum. Copper which has a characteristically red color, absorbs all colors, excepting red, quite well. A large percentage of red light incident on copper is reflected. In the infra red band less than 2% of the incident radiation on this brightly polished metal is absorbed. The discussion which follows will be confined chiefly to emissivity and absorptivity in the ordinary temperature field (0° to 150°) and materials which are being used in construction.

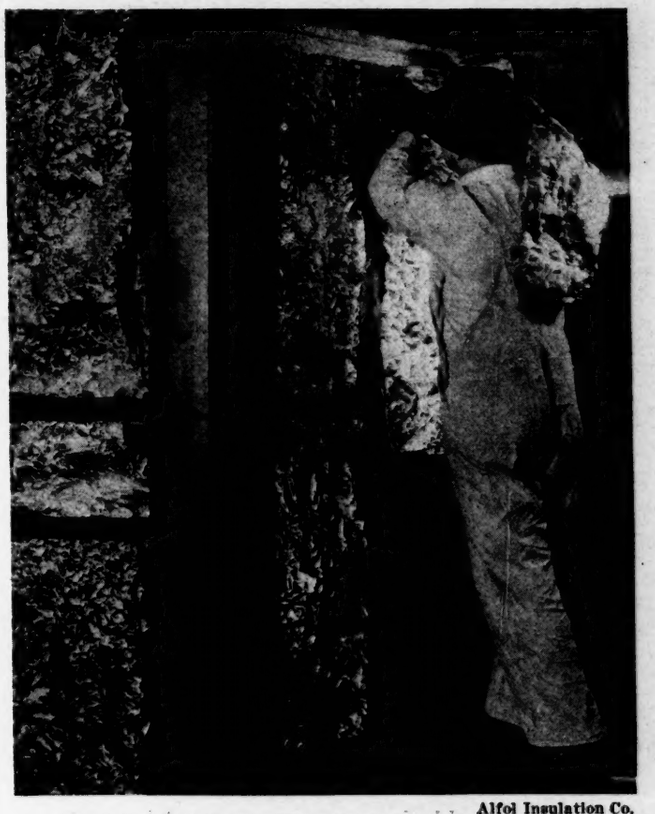
There is still some confusion about how metallic insulation produces heat resistance. When heat flows at ordinary temperatures across air spaces bounded by conventional building materials (emissivity about 0.90), 55% to 75% is transferred by radiation. From Equation 1 it is evident that this radiant transfer may be reduced by introducing one or more surfaces with low emissivity to reduce the emissivity factor Fe, or by imposing a number of screens to increase the screening factor (n + 1). Brightly polished metals such as aluminum foil diminish the emission or reflect radiant heat, while screens reduce the radiant heat by imposing a number of barriers to radiation. In the latter method, as the number of screens is increased it is not essential that their emissivities be low. For example, good insulation is obtained from closely spaced thin sheets of high quality paper (emissivity 0.90). These methods produce effective insulation by materially re-

†Instructor in Engineering Research, The Pennsylvania State College.

[1]See bibliography at end of article.

Alfol Insulation Co.

Fig. 1. Crumpling metal foil



Alfol Insulation Co.

Fig. 2. Placing crumpled foil in air space in wall

ducing the large radiant heat transfer across conventionally bounded air spaces.

Experimental Determinations

To obtain the heat transfer coefficient for an air space containing a bright metallic surface and to demonstrate its efficacy as a heat insulator, tests were made with an experimental assembly shown in Fig. 4. This is a common construction of a 3⅝-in. air space bounded by high emissivity surfaces. Wall board, like most building materials, has an emissivity of approximately 0.90. The conductance of the 3⅝-in. air space was measured and found to be 1.1 B.t.u. per sq. ft. per hr. per °F. at 70° mean temperature (a-Tests, Table 1). After dividing the air space into two equal spaces 1.81 in. thick by inserting a sheet of 0.001 in. aluminum foil, the conductance was found to be 0.201 B.t.u. per sq. ft. per hr. per °F. at 70° mean temperature (b-Tests, Table 1). The foil (c-Test, Table 1) was torn at the top and bottom of each section, permitting some convection and direct radiation between the hot and cold surfaces. The conductance increased to 0.246 B.t.u. per sq. ft. per hr. per °F. at 70° mean temperature.

In order to use Equation 1, it is necessary to know the emissivities of the materials bounding and within air spaces. Tabulated in Table 2 are experimentally determined emissivities for various metallic heat insulating surfaces, along with heat transfer coefficients for thin sheets of steel having oxides on the surface. The emissivity was measured by placing two 12 in. × 12 in. guarded hot plates in a horizontal plane so that all the heat from the main heater at the bottom was forced downward by the guard heater through two ½-in. air spaces separated by the specimen.[3] In this manner practically still air conditions were obtained in the air spaces. The hot and cold plates were covered with coatings of lampblack and shellac having an emissivity of 0.906. For the conductance experiments one guarded hot plate was sandwiched between two similar specimens. The specimens were bounded on the outsides by two cold plates.

Discussion of Results

A comparison of the a and b series of data in Table 1 indicates that the aluminum foil adds considerable heat resistance to the wall. If a plot is made of these data (conductance vs. mean temperature) it will be found that the conductance of the plain 3⅝-in. air space is 1.1 B.t.u. per sq. ft. per hr. per °F. at 70° mean temperature. At the same mean temperature the conductance dropped to 0.202 upon inserting the sheet of aluminum foil. Replacing the aluminum foil with a sheet of ordinary paper would produce a conductance of 0.55. The screening factor along with the low emissivity aluminum accounts for the insulation produced in this experimental assembly. When installing a fragile material such as foil, there is a chance of it being torn. In c test of Table 1 a measurement was made after removing 4 sq. in. from the top, center and bottom in each section between the studs. Although the coefficient increased from 0.202 to 0.246, the net effect of this increase on the transmittance of a wall would be negligible.

It is now customary to obtain the transmittances of

TABLE 1

Test No.	Heat Input B.t.u. per Sq. Ft. per Hr.	3⅝ in. air space boundary Hot Side Temp. °F.	Cold Side Temp. °F.	Temp. Diff. °F.	Mean Temp. °F.	C B.t.u. per Sq. Ft. per Hr.	Remarks Conventional 3⅝ in. air space
1–a	4.69	46.33	40.37	5.96	43.35	0.785	
2–a	10.10	57.15	46.00	11.15	51.50	0.905	1 sheet aluminum
3–a	17.50	71.49	54.46	17.03	62.98	1.028	foil 2—1.81 in.
4–b	4.69	65.70	39.10	26.60	52.40	0.177	air spaces
5–b	10.10	94.75	44.37	50.38	69.50	0.201	Same as b series ex-
6–b	17.50	134.30	53.20	81.10	93.70	0.216	cept aluminum torn
7–c	10.10	85.20	44.20	41.00	69.70	0.246	at top and bottom.

walls, ceilings, and floors by calculating them from the conductances and conductivities of the individual parts. The conductance of a vertical air space bounded by aluminum foil on one side and a building material on the other can be calculated as follows from the b test data in Table 1:

C_1 — Conductance 3⅝-in. air space bounded by wall board (emissivity 0.9) and divided into two equal spaces (1.81 in. thick) by a 0.001 in. sheet of bright aluminum.
C_1 = 0.202 B.t.u. per sq. ft. per hr. per °F. at 70° M.T. (Experimental result)

C_2 — Conductance of air space (1.81 in. thick) bounded by wall board and bright aluminum.

$$C_1 = \frac{1}{\frac{1}{C_2} + \frac{1}{C_2}} = 0.202$$

C_2 = 0.404 B.t.u. per sq. ft. per hr. per °F.

This value holds for air space widths from ¾ in. to 4 in.

What thickness of board or blanket form of insulation will produce as much insulation when applied in the same manner as that in the b tests of Table 1?

C_3 — Conductance of air spaces bounded by wall board and either board or blanket insulation.
C_3 = 1.1 B.t.u. per sq. ft. per hr. per °F.
k — Conductivity of insulation
k = 0.34 B.t.u. per sq. ft. per hr. per °F. per in.
x — Thickness of insulation in inches

$$C_2 = \frac{1}{\frac{1}{C_3} + \frac{1}{C_3} + \frac{x}{k}} = \frac{1}{\frac{1}{1.1} + \frac{1}{1.1} + \frac{x}{0.34}} = 0.202$$

x = 1.06 in.

It would take 1.06 in. of board or blanket type of insulation to produce the same insulating effect as the one sheet of bright metal foil and applied so that each has the same air space advantage.

A study of the changes produced in the transmittance by the type of insulation and its position in a wall is interesting. In Table 3 the calculated values of (U) are tabulated for insulation variations in a common type of construction—4 in. brick veneer (wall ties to sheathing), ¾ in. air space, building paper, ⅞ in. wood sheathing, 3¾ in. air space, paper covered gypsum lath, and ½ in. plaster.

From the analysis in Table 3, it is evident that one bright aluminum surface produces about the same insulating effect as ½ in. of other insulation material (compare wall Nos. 23, 24, 25, 26, 29, 30, 31). If dust, soot, corrosion, or condensation should raise the emissivity of the aluminum surface to 0.90 in wall No. 25 the transmittance of wall No. 26 would obtain. Wall No. 29 would have a U the same as No. 20, No. 30 the same as No. 27, and No. 31 the same as No. 28. In wall No. 32 radiation in the 3¾ in. air space is eliminated by filling it with a fill type of insulation having a conductivity of 0.34.

Aluminum is a very active metal and upon exposure to air a thin protective oxide coating quickly covers the surface. Fortunately, this oxidized surface has an extremely low emissivity. However, the oxidized surface does not offer sufficient protection in the presence of an alkaline or corrosive atmosphere. As a means of preserving the brightness of the surfaces a thin coat of lacquer (about 0.00005 in. thick) is spread over the foil. Emissivity measurements of clean embossed aluminum foil gave a value of 0.075, while lacquered embossed aluminum foil gave a value of 0.142 (see tests 14-i and 13-h of Table 2). Although the percentage increase in emissivity is large, the lacquered foil will produce insulation having a conductance per inch (plane sheets) of approximately 0.23. Since the coat of lacquer was so thin it was decided to compare the corrosive action of calcium chloride brine on the clean

TABLE 2

Test No.	Heat Output B.t.u. per Sq. Ft. per Hr.	Hot Plate Temp. °F.	Cold Plate Temp. °F.	Temp. Diff. °F.	Mean Temp. °F.	C/1 In. B.t.u. per Sq. Ft. per Hr. per °F.	e Emissivity	Position	No. Air Spaces	Air Space Thickness, In.	Specimen
8–d	22.33	82.35	34.55	47.80	58.5	0.465	....	Vertical	2	1/2	o
9–d	33.40	101.35	34.57	66.78	67.9	0.493	....	Vertical	2	1/2	o
10–e	17.75	84.60	34.40	50.20	59.5	0.354	....	Vertical	3	1/3	o
11–f	40.85	114.50	34.20	80.30	74.3	0.510	0.72	Horizontal	2	1/2	o
12–g	22.23	129.50	55.00	74.5	92.3	0.299	....	Vertical	2	1/2	s
13–h	24.00	132.70	34.50	98.2	83.6	0.245	0.142	Horizontal	2	1/2	t
14–i	24.00	146.4	33.3	113.1	89.8	0.212	0.075	Horizontal	2	1/2	s
15–j	24.00	136.7	34.3	102.4	85.5	0.234	0.120	Horizontal	2	1/2	u
16–k	24.00	122.7	34.4	123.7	84.1	0.269	0.185	Horizontal	2	1/2	v

o. Black steel plate (oxides not removed)
s. Aluminum foil clean
t. Aluminum foil 0.00005 in. lacquer on surfaces
u. Full finished commercial tin mill black steel plate
v. Hot rolled and annealed steel plate

American Flange & Mfg. Co.

Fig. 3. Installing a dull surface metallic insulation. The sheets have low emission and high reflection values at the frequencies of radiant heat.

and lacquered foils. After immersing samples of each in the brine for five days, they were removed and allowed to lie in the air for three days. At the end of that time the originally clean foil had almost completely disintegrated, while the surface of the lacquered foil appeared unchanged and the foil was unharmed by the brine.

There are two methods of applying aluminum foil as insulation. One is to crumple the thin sheets (0.0003 in. thick), then spread them to fit the contour of the object to be insulated. The other method is to cement thin sheets of foil to paper, thus providing rigidity. The foil covered paper is then spaced uniformly in an air space so that no metallic contact occurs. In the first method the thin foil makes metallic contact at random points, which increases the conductance over that of plane spaced sheets as applied in the second method. The conductance of three sheets per inch of crumpled foil was found to be 0.35 B.t.u. per sq. ft. per hr. per °F., whereas, the conductance of three plane sheets per inch was found to be 0.22 B.t.u. per sq. ft. per hr. per °F.[3] When the foil is cemented to a supporting base, one surface for each sheet applied is lost. Unless a bright metallic surface faces an air space, it has no insulating value. The most efficient utilization of foil for insulation, providing it is not too fragile, is in plane sheets spaced about 5/8 in. apart so that no metallic contact occurs.

Although aluminum foil has produced an excellent low density insulation, care must be exercised in sealing it so that condensation, dust, soot, or corrosive vapors do not destroy the bright surface. Refrigerated room installations on board a motorship plying in the tropics for the past two years have indicated that this insulation can be applied so that it will stand up under severe service conditions. Examination of several installations where operating conditions have been severe has shown that the foil has maintained an excellent surface and no settling has occurred from vibrations.

Recently thin sheets of full finished tin mill black steel plate have been used for insulation. They are crimped with a semi-cylindrical rib spaced every 4 in., and alternate ribs open on opposite sides of the sheets. This provides a rigid sheet of material. The plate is rolled free of oxides and has a low emissivity (0.12—See Test 15-j, Table 2). Since no attempt has been made to add a protective covering to prevent oxidation of the metal, such as a thin coat of lacquer, similar to that on the aluminum foil (Test 13-h, Table 2), it is doubtful if this low emissivity can be maintained very long. As soon as oxidation starts, the emissivity will rise and may reach 0.90, which will materially reduce its insulating value. Both conductance and emissivity determinations were made upon No. 15 gauge black steel sheets (Tests (8-9)d, 10-e, Table 2). Black steel sheets which do not have the oxides removed were found to have an emissivity of 0.72 (Test 11-f). This value is in agreement with the usually accepted value.

Conclusions

1. Low emissivity materials such as clean metallic foils form excellent low density heat insulators *when facing air spaces.*

2. A single sheet of bright aluminum foil suspended in an air space will produce approximately the same insulating effect as 1 in. of board or blanket form of insulation, both having the same air space advantage.

3. An air space (3/4 in. to 3 5/8 in. in width) bounded by a conventional building material on one side and a bright aluminum surface on the other will have a conductance of 0.404 B.t.u. per sq. ft. per hr. per °F. at 70° mean temperature.

4. Although crumpled foil has the advantage of be-

ing easy to apply to the surface contour of the article to be insulated, it has a higher heat transfer coefficient than the plane spaced sheets.

5. Since atmospheric dust pollution is prevalent in industrial communities good sealing‡ is required for metal insulation, otherwise dust, soot, and condensation will seriously impair its insulating qualities. In refrigeration work hermetic sealing is required to exclude moisture.

6. Lacquer which has an emissivity of 0.90 if applied in a thin enough layer will not seriously affect the emissivity of metals for insulation purposes.

7. Full finished tin mill black steel plate makes good metallic heat insulation providing corrosion can be avoided.

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‡This insulation is enclosed within the building structure as it is installed in practice, and this assists in sealing and reduces pollution of the insulation. Other insulation forms usually require sealing against moisture—*Editor.*

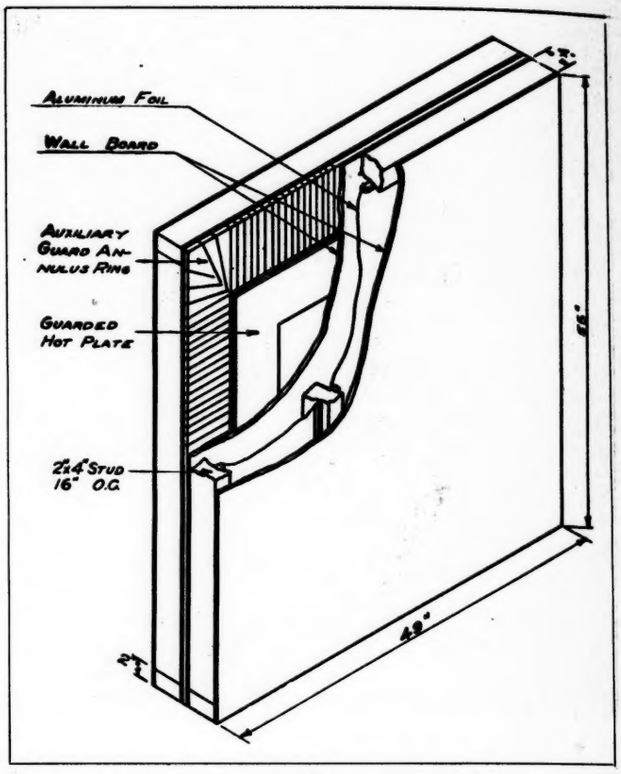

Fig. 4. Experimental assembly to determine heat transfer coefficient for an air space containing a bright metallic surface.

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TABLE 3

Wall No.	Veneering Brick, In.	Air Space, In.	Paper Covered Sheathing, In.	Air Space, In.	Insulation	Air Space, In.	Plaster Base	Plaster, In.	U—B t.u. per Sq. Ft. per Hr. per °F. (Air to Air)
20	4	¾	⅞ Wood	3¾			Rock Lath	½	0.201
21	4	¾	½ Insulating Board	3¾			Rock Lath	½	0.180
22	4	¾	1 Insulating Board	3¾			Rock Lath	½	0.143
23	4	¾	⅞ Wood	1⅝	½ in. Insulating Blanket	1⅝	Rock Lath	½	0.141
24	4	¾	⅞ Wood	1⅜	1 in. Insulating Blanket	1⅜	Rock Lath	½	0.117
25	4	¾	⅞ Wood	1⅞	2 Polished Aluminum Surfaces	1⅞	Rock Lath	½	0.110
26	4	¾	⅞ Wood	1⅞	2 Blackened Aluminum Surfaces	1⅞	Rock Lath	½	0.172
27	4	¾	⅞ Wood	3¾			½ in. Insulating Board	½	0.162
28	4	¾	⅞ Wood	3¾			1 in. Insulating Board	½	0.131
29	4	¾	⅞ Wood	3¾			Aluminum Foil on Rock Lath	½	0.151
30	4	¾	⅞ Wood	3¾			Aluminum Foil on ½ in. Insulating Board	½	0.130
31	4	¾	⅞ Wood	3¾			Aluminum Foil on 1 in. Insulating Board	½	0.108
32	4	¾	⅞ Wood	...	3¾ in. Fill k = 0.34		Rock Lath	½	0.070

Fuel War Wages Furiously

with Chicago the major battle ground; coke stokers gain; Oil Heating Institute revived; Windy City has 22,000 gas conversion burners

"DURING August the people of the Chicago region purchased more than 4,000 gas heating units—of which the majority were burners for converting residential heating plants to gas."

In this way Peoples Gas Light and Coke Company introduced a full page newspaper advertisement in the September 14 *Chicago Tribune*. Although the bold-face heading of the ad, "Everybody's Installing Gas Heat," was not literally true, the utility was literal in listing the vocation of the August purchasers, from 58 accountants to 12 writers[1]. At the time the advertisement was being written, September sales were running 111% above August, bringing total conversion installations on the company's lines to about 22,000. One year ago (July 1, 1933) there were only 6,877 such burners in use in Chicago.

The week before this advertisement appeared, the utility quoted Dante R. Barrone, a two-flat owner who heats with gas, posed for three photographs, reported that ". . . gas heat . . . has actually cost us less."

To which the Chicago Coal Merchants Association countered by telling its customers in similar advertisements that "Gas Cost Twice as Much as Coke." The statement quoted was that of one Emil Marousek of Berwyn, whose brick bungalow was heated for $159.55 with gas[2], for $81.39 for coke.

Readers of the *Chicago Evening American* on September 13 were warned[3] that "Oil Heat costs so much less than any other form of automatic heat that any other installation is expensive . . . even if free." This message was paid for by the Burning Oil Distributors Association and the progressive Chicago Oil Burner Association as a joint undertaking.

The Chicago gas heat campaign is by far the largest ever carried on in a single metropolitan area. Three utilities participate—Peoples Gas Light and Coke Company; Public Service of Northern Illinois, and the Western United Gas and Electric Company. The drive has three main features. 1—A low rate for house-heating (58 cents for the first two therms; 15.8 cents per therm for the next 24, and 7 cents per therm thereafter); 2—Low rental for burners, and 3—Intensive selling effort.

Employed in the campaign are 320 salesmen experienced at home specialty selling. The salesman gets $16 in commission if the burner stays in 3 months. In addition to the salesmen, 105 dealers (largely heating contractors) were enlisted and have contributed materially to the campaign's success.

The brisk competition back of these verbal bombs focused on Chicago[4] the attention of all oil, coal, and gas men. Not so prominent (but of equal importance) were other developments in the fuel and related equipment business.

Oil

American Oil Burner Association's President Sherman last July appointed a committee to consider reviving Oil Heating Institute, originally organized to handle propaganda for oil heat, assist consumers in selecting an oil burner (from those made by manufacturer members), otherwise aid burner makers. On September 11 a reorganization meeting was held in the Roosevelt Hotel, near A.O.B.A.'s headquarters in New York. Eight burner makers and one accessory manufacturer agreed to underwrite the "educational" program to be developed for 1935[5].

The City of New York adopted last June new oil burner rules. Following the effective date (July 9) a chaotic situation developed, for the Board of Buildings refused to recognize the new rules, issued unauthorized rules and regulations verbally. The situation was brought to a head by the Board of Buildings publishing in the City Record a notice of public hearing, announcing its intention of adopting rules and regulations governing the installation of oil-burning equipment.

John J. McElligott, fire commissioner, requested an opinion from the corporation counsel, who decided that the fire department should abide by the new rules (as approved by the Board of Standards and Appeals), should ignore rules of the Board of Buildings which conflicted with the new rules.

The oil price situation remains practically unchanged with one exception: Standard Oil of New Jersey posted two cuts of ¼ cent a gallon each in the New York terminal prices of burner oil, both cuts being made in September.

An arrangement has been concluded by which a new organization, known as "Esso Marketers," a subsidiary of Colonial Beacon Oil Company, will market, install, and service the Gilbarco oil burner in the Boston metropolitan area. The purchaser will also be supplied with his fuel oil, all under one agreement, if desired. Servicing includes regular inspection by factory-trained specialists. The plan, known as the United Responsibility plan, is also in effect through a similar service in Newark, Baltimore, Washington, and Philadelphia. Under the terms of this plan, the purchaser pays $25 down for the burner installation, which includes a 550-gal. outside fuel tank, and $7.90 a month for 30 months. Interest is at the rate of approximately 3.1% for one year, or 9.3% for three years, slightly less than the Federal loan rate for home improvements.

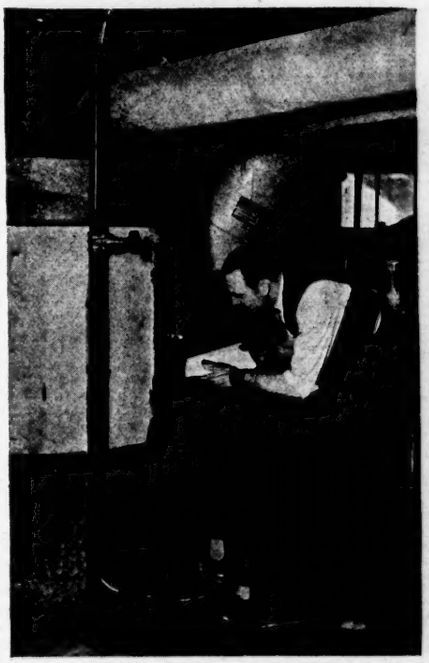
Esso Marketers handles its own financing, backed by Beacon Oil and Standard Oil. If the customer desires, the Marketers will install radiators and boilers on the same terms. If other than a Gilbarco burner is desired, the

[1]Between which alphabetical extremes were 123 barbers, 349 clerks, 92 engineers, 151 grocers, 478 restaurants, 199 salesmen, 13 undertakers, and (surprisingly) 76 laborers.

[2]Not including $21 per season burner rental.

[3]With the ominous introduction "Before you put a White Elephant in your basement—Read this ad!"

[4]Additional Chicago news: T. A. Marsh (Iron Fireman), watchful of interests of coal men, noted that A.S.M.E. had scheduled a domestic heating session for its meeting next December, that coke, oil, and gas were covered on the program, that coal was prominently absent. Told of this, the Committee of Ten, meeting in Chicago September 12, pledged themselves to protest to A.S.M.E.



Installing a gas conversion burner in a Chicago home

[5]A temporary board of directors to be elected October 9.

terms are 10% down, the fuel arrangement being the same, the customer buying as he needs it.

Coal and Coke

Coke is no weak contender in the competition among fuels, nor has it been for some years[6]. Its use will probably be furthered by a new company formed in Chicago last month with the engaging name of Care Free Heat, Inc. Thirty-seven coal dealers backed the enterprise.[7]

The new company has made a contract with Furna Slave, Inc., Indianapolis stoker builder, for a number of automatic coke-burning stokers. Purpose: to further the use of solid fuel in the Chicago area. The stoker itself is completely automatic. The owner fires no coke into the furnace. A thermostat controls the flow of coke into the firepot from the bin. Grates are automatically shaken, removed to a receptacle through a sealed screw conveyor.

The coke bin is filled from the outside and is sufficiently large to accommodate enough coke for several weeks' use, depending on weather conditions. When the coke in the bin reaches a certain level—about 500 lb.—a red light glows in the thermostat, warns the householder that the bin needs replenishment. He then calls his dealer, who fills the bin.

It is claimed that the cost of electrical energy is 36 cents per ton of fuel consumed.

The stoker uses only coke (range or No. 1 nut size) and is intended only for small houses.

Gas

Starting in May, the House Heating and Cooling Committee of American Gas Association began issuing a series of articles on heating and cooling with gas.[8] The fifth, released in September, covers the delicate subject of "Competitive House-Heating Fuels and Their Relative Costs[9]," begins with a table rating various types of equipment, credits gas heating with almost a straight A, gives oil burner-boiler units an average of B, stokers a C. Fuel cost analyses are presented in an attempt to show that gas heating costs less than with an oil burner-boiler, slightly more than with a conversion oil burner, and a few per cent more than with a stoker[10].

Although Century of Progress will be torn down this fall, the main "villages" will reopen about November 30, and heating systems are being installed. Gas heat may be used in many buildings. The American Radiator Building has a steam jet system, supplied from a gas boiler, and 55 concessions have gas-fired unit heaters. Gas is also used for many miscellaneous purposes, such as maintaining the baby incubator at 90°; baking 7000 loaves of bread at Wonder Baking exhibit; firing pottery; cleaning and pressing uniforms of attendants and guards.

[6]By-product and beehive coke sold for domestic heating totaled only 2.7 million tons in 1923, rose to 7.5 million by 1929, last year jumped to 10.5 million tons. Last heating season (1933-34) Massachusetts alone consumed 1.06 million tons of coke, compared with 2.97 million tons of domestic anthracite, 155,000 tons of buckwheat, 700,000 tons of soft coal, 101,000 tons of briquets, 300 million gallons of oil and 2.4 billion cubic feet of gas.

[7]Officers are: Leon Glenicki, Polonia Coal Company, president; Frank W. Collins, Barr & Collins, vice-president; Oscar Swenderud, J. J. Wallace Coal Company, treasurer, and R. A. Miller, Miller & Banker, secretary.

[8]Previous articles covered sales plans, heat conservation, controls, individual apartment heating. Subsequent articles will cover installation, retention of customers, winter and summer conditioning, advertising with heaters.

[9]Prepared by H. P. Morehouse, general air conditioning representative, Public Service Electric & Gas Co., Newark, N. J.

[10]All of which are based on a premise of insulating the house if gas heating is selected. The heat conservation is carried to a point where the total investment in plant (and insulation, when gas is used) is about equal for the two fuels.

Free Service for Equipment Buyers

Boston plan aids property owner in selecting heating apparatus. Fee paid by dealer.

PROSPECTIVE homebuilders are usually in a tough spot. Most of them retain no architect, lean heavily on building contractors for advice, often have little ambition left thoroughly to canvass heating contractors and dealers for information on heating systems and equipment. Permanent building exhibits help, but on the whole ". . . there is a definite lack of exchange of information and usually a lack of cooperation between the various business and professional interests connected with the building industry. There is almost no adequate machinery for directing urban people to sources of information."[1]

The homeowner seeking advice on heating or air conditioning his building will usually turn to a heating contractor. If he is willing to pay a fee, he will retain a consulting engineer.

Which . . . OIL or GAS?
WRITE or PHONE for FREE BOOKLET
"HOW TO BUY AUTOMATIC HEAT and AIR CONDITIONING"
If you are confused and weary, from looking and listening, you will appreciate our unbiased, confidential FREE counsel. Whether it's the purchase of an inexpensive Burner, an Oil or Gas Furnace, or Air Conditioner, the INSTITUTE can be of inestimable help with its guidance and counsel.
Don't hesitate to ask for FREE Booklet, or Counsel. No salesman or solicitor will call. We have no burner to sell. Our EXPERIENCE and SERVICE is yours for the asking
AUTOMATIC HEAT INSTITUTE
93 MASS. AVE. KENMORE 2133

Or he may visit a building exhibit.[2]

Some weeks ago three Boston men[3] had an idea, organized a firm whose policy is a variation of the consulting idea, named it Automatic Heat Institute. Purpose: To provide a free advisory service for the property owner in selecting automatic heating equipment. Service includes: Survey, a report and other information within 48 hr. of the survey, and guidance in the selection of the equipment and installing organization. This is followed by supervision of the installation, seeing that all provisions of the agreement between the property owner and the seller are complied with. Advantages: Saves owner from visiting numerous showrooms, becoming confused by conflicting sales talks.

Only voluntary applications from property owners in immediate need of advice and information are accepted. No solicitors are employed. Following the application a service questionnaire blank is mailed and this returned to the Institute, which immediately starts the survey. The Institute derives its payment as a commission from the dealer. However, none of the personnel or the Institute itself have any connection with any dealer, manufacturer, distributor, or fuel concern.

[1]Quoted from the almost-forgotten President's Conference on Home Building and Home Ownership, 1932.

[2]Such as Architects' Samples Corporation in New York; Builders' Exhibit, Cleveland.

[3]James Maratta (formerly with Minneapolis-Honeywell and Lawton Engineering Company), Thomas S. Bobrick (formerly of Holland Furnace and G.E.), and John Dinsmore, president of the Boston Service Bureau.

Heating and Ventilating

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MODERNIZING

•

A monthly section for promoting the interests of engineers and contractors in the modernizing and renovizing of heating, ventilating, and air conditioning plants in buildings.

The Federal Housing Plan, its progress and the part which heating men are taking in it is so much the outstanding development of the month that it overshadows other important modernizing news. This news is that the government is making two other moves, tentatively, to be sure, to set up a means for promoting modernizing in buildings other than those covered by the present plan.

It is significant that both the need for a supplementary plan and the importance of a suitable agency being organized are recognized and understood. The possibilities of modernizing in apartments, office buildings, factories, and similar places are well known to all of us. Most of us are also acutely aware that the present plan, while permitting considerable amounts of work in such buildings, is not aimed specifically at them but is primarily for homes. Many are convinced that the repair and modernizing so necessary in largen buildings cannot be done until the mortgage situation is straightened out or until some alternative method not now in use is devised. Among such methods are several which look to governnment aid and these are the basis of proposals now being looked into. Just what will come of these studies there is no way of predicting, but some plan is almost certain to be brought out.

What is especially meaningful to us in this connection is that the general idea of modernizing as a means of opening up work for the whole building group is now in a position where it can really go places, and there is every reason to believe that it will be actively with us and increasingly important for several months at least and possibly for several years. The lesson is that you may as well get modernizing-minded now, see if there is anything in the present plan for you, and if not, be alert and ready to help in the broadening of the scope of modernizing work. If the present plan goes over, the demand for a broadening will be insistent and may come at any time.

This month we continue under the head "On the Firing Line" (page 35) a series of articles telling how typical firms are able to do modernizing work to advantage. This month we deal with gas heat, room coolers, and boiler and radiator replacements. We doubt if there is anything novel in the methods but believe that they contain suggestions worth consideration.

Beginning on the next page (30) you will find a summary of field reports dealing with how heating men in various sections are reacting to the Federal Housing Plan, how the plan is progressing, and the methods being used.

FHA Plan Takes Hold Slowly but Steadily

Here is a summary of plans, opinions, and observations right from the field. They show modernizing from FHA efforts is spotty, but encouraging. Local campaign plans are ingenious and sponsored by a variety of groups. Much soliciting, some contracts. Peak believed far from being reached.

DURING the two months that FHA has been in existence it has moved rapidly at Washington to whip an organization into shape and to get its plans formed and moving. At the same time a field organization has been formed, policies stated, banks and financing companies signed up to the insurance plan, practical helps in the form of printed material have been put out, and an intensive drive for publicity and support launched.

There has been keen interest on the part of the industry. Manufacturers hastened to get their distributing organizations lined up and their sales plans adjusted. Contractors and dealers were alert to the possibilities and as a group were anxious to get going. Naturally, in the midst of such necessary activity there has been little opportunity to appraise results so far, or to take time out to look around.

While there is little information from FHA headquarters as yet, what concrete figures are available indicate that heating equipment is accounting for an unexpectedly large part of the total loans. In fact, these loans were leading all others with nearly 15% of the first 1000 loans made. The average loan is reported to be about $450. The total number made now exceeds 10,000.

Believing that our readers would be interested in knowing what is being done by heating men throughout the country, HEATING AND VENTILATING secured reports from men actively in touch with what is going on in many cities and towns throughout the country. These reports are summarized on the following pages. There are probably ideas here for you, for the plans and campaigns outlined are bringing results.

Alabama

Birmingham—Since the Federal Housing program got under way in Alabama and up until September 15, a total of $200,000 worth of loans for home repairs were made by Alabama banks. The loans averaged around $500 to $750 each and were mostly made on estimates of some contractor who had initiated the business.

The building trades of Montgomery have taken the lead in the state modernization campaign by arranging to set up a house in Court Square, with one side thoroughly renovated and modernized from foundation to chimney top. The other half of the building will not be touched. D. L. Whetstone is general chairman of the building committee of which W. T. Perry, former president of the Alabama Master Plumbers, is a member. Building permits in the city have recently shown an encouraging increase.

The Merchants National Bank of Mobile, with 34 loans to its credit for a total of $20,020, is leading all other banks in the state in closing home repair loans.

In Birmingham plans for a home show are being worked out. One idea developed is to name property owners who have repairs made on a civic honor roll. Charles Wheelock represents the heating men.

Colorado

Denver—Machinery for financing home repairs and remodeling under the Federal Housing Act has been set up in Colorado, but as yet few loans have been made and few contracts let on the strength of the act in this state. There is, however, excitement and enthusiasm, prerequisites of every successful movement. What is needed now is organization and direction, and these are being whipped into shape as rapidly as possible.

Indications are that within another month the machinery will be working smoothly, pumping activity and money into the building industry of this district.

A committee, headed by Samuel Johnson, real estate dealer, has been appointed by the Denver Chamber of Commerce to coordinate all activities under the act and to sponsor an educational campaign to disseminate information and gather lists of prospective customers. The Colorado Construction League, organized last March and composed of associations representing practically every branch of the building industry, is behind the movement. At a recent meeting a housing campaign committee was named, with D. D. Sturgeon, electric contractor, as chairman. This committee is holding almost daily conferences with the chamber group in working out the campaign.

The tentative plan is as follows: A central information bureau is located at the Chamber of Commerce, and all inquiries at present being made of banks and loan companies are directed there; about 100 unemployed white-collar workers will be employed for a house-to-house drive; prospect lists will be compiled from information gathered in this manner and will be furnished to anyone interested.

The Construction League is expected to pay the expenses of the information bureau and campaign supervision. The Federal Emergency Relief will be asked to pay campaigners' wages.

One hundred and twenty-five banks in Colorado, 95% of the total, 50 building and loan associations, and a large number of independent loan companies

have signed up for government insurance on 20% of repair loans. On September 15, 40 loans had been made under the act in 14 of Colorado's 63 counties.

Connecticut

Hartford—A considerable volume of heating plant modernization is under way in Connecticut, with air conditioning equipment being installed in many homes, and the FHA program is expected to add impetus to the drive for this business. While the Federal aid plan has not been in effect long enough to show many definite results, a marked increase in modernization work is looked for.

Heating contractors are falling into line with lumber and construction firms as the campaign to cash in on the FHA plan gets under way. Considerable newspaper advertising has been used by heating equipment dealers in this city and New Haven to drive home the FHA message to prospects. In a special section published by one New Haven paper, 10 heating contractors and a gas utility company were represented.

Last winter's prolonged cold spell and record-breaking low temperatures proved the utter inadequacy of many house-heating plants, and replacement of obsolete furnaces had been started on a wide front several months prior to the effective date of the government loan plan. Utility companies are featuring the advantages of gas heat in their advertising, while the matter of economy is being stressed by coal, coke, and oil interests.

Some contractors have been inclined to minimize the value of the FHA program, holding that "people who are able to meet the loan requirements don't need a loan," and taking the attitude that "nobody has any money to spend for modernization anyhow," but a number of more progressive operators in the heating field are going after the business and getting it.

Idaho

Boise—FHA modernizing is just nicely getting under way here. State Director Harry Whittier is setting up a campaign program in the larger towns of Idaho, where he personally contacts building owners to get their reaction to the modernization program and to try to put them in the frame of mind favorable to taking advantage of the FHA plan, and advise with them on where such loans may be made. He has found the public responsive and many loans have been applied for, but few loans actually made. This is a temporary condition which is expected to change markedly in the near future.

Illinois

Chicago—The Better Housing and Modernizing Campaign was officially opened here September 18 with a conference and luncheon at the Palmer House, W. D. Flanders, chief field director, and Ward M. Canaday, director of Public Relations of FHA, attending. The meeting was attended by about 1000 business men.

One drawback to the campaign is due to the tax disputes in Cook County. The fact that people have been withholding paying all of their taxes while awaiting adjustments has been the reason for disqualifying many loans. Likewise, those behind on their mortgages have been prevented from obtaining loans.

American Radiator's local branch made over 100 loans up to September 25, with thousands of leads on hand, and it is reported that the branch has re-hired some of their old employes. This company's display at the Century of Progress has been the source of many leads, with about 100 people daily asking about definite information on repairs and 15 to 25 asking about new building construction.

Crane Company made $30,000 in loans in a period of less than 10 days. Of this, Chicago contractors have turned in about 15 loans averaging about $400 each. Ninety per cent of these loans are for heating materials.

Indiana

Indianapolis—A great deal of interest has been aroused by the campaign just started by the Construction League of Indianapolis to acquaint the people with the particulars of the FHA's program of stimulating business with loans to those who are wanting remodeling work done, but can't float the extra expense.

D. M. Millholland, research director for the Construction League and prominent local engineer, reports that the League has been working on the plan adopted by the FHA for the past year and a half, thus giving this city a long start on their proposed campaign for more business. The campaign got under way the first of October and will continue through the fall and winter. This will include a speaking program, backed by literature and personal talks to acquaint the people with the plan and their products. The League is being assisted in this work by the local Chamber of Commerce.

The two organizations will move an old five-room bungalow to the southeast corner of the Post Office lawn. This house will be completely remodeled by the League. Girls will be stationed on the downtown corners, dressed in special caps and badges, passing out literature on the subject. The Publicity Committee of the Chamber of Commerce has procured every piece of literature, signs, and show cards that the Federal authorities will send them. They have arranged for trucks to be donated for the distribution of this literature. Short speeches are being broadcast from both of the local radio stations, WKBF and WFBM, by prominent men in the business. Everybody is cooperating to the fullest extent to put this campaign over.

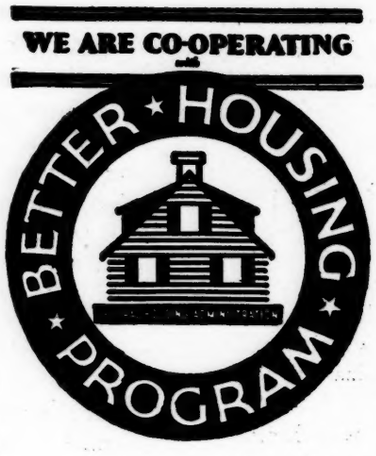
The Fletcher Trust Company is making arrangements to take care of the parties making loans.

Another idea to be pushed by the campaign managers is the placing of miniature houses, one old and one modern, in store windows to show the effect of a remodeling to an old house. These will be placed in the center of attractive window displays in all the available downtown store windows. This will be worked in conjunction with a downtown office that will give out desired information to interested parties. The names

of those interested are passed on to dealers to follow up and try to sell or give bids on work to be done.

There has been a decided interest shown in the installation of heating systems. The names of prospects are relayed on to heating contractors who make their surveys and recomendations to property holders. These men are followed up by salesmen who quote prices and terms.

Six building and loan associations of the Marion County League of Building and Loan Associations will sponsor the modernization of six different type houses in various sections of Indianapolis. Each association participating in the remodeling campaign will plan and execute individually the changes to be made in its own house.



Maine

Portland—A feature of the FHA drive in this city is the issuance of the Annual Industrial Edition of the *Portland Evening News,* which was entirely devoted to home modernizing.

Among local concerns actively cooperating with the campaign are the Gould-Farmer Company, Minneapolis-Honeywell Sales of Maine, Arthur H. Moulton, Carl M. Haskell Plumbing Company, Myles F. O'Sullivan Company, Halverson Brothers, and H. L. Blake & Company.

Massachusetts

Boston—This city's part in the Federal Government's better housing campaign is moving swiftly forward, with the appointment of a large Boston committee to direct a drive for building repairs. In addition, at a recent luncheon held here, representatives of manufacturers and wholesalers of building materials and supplies of all kinds listened to an exposition of the meaning and purposes of the National Housing Act, and pledged their support to forward the movement throughout the six New England states by means of state and community committees. Joseph E. Scanlon has been named as general chairman of the Boston committee, assisted by two large executive and advisory committees. A house-to-house canvass, in which members of a large sub-committee in each district of Boston will urge property owners to have their buildings repaired, has been announced.

Twenty-six cooperative banks and 35 mutual savings banks have joined in community advertising for depositors and for loans on first mortgages, in the Boston metropolitan area.

Two of the leading newspapers have established modernizing departments, with special editors in charge. One of these had 600 inquiries from homeowners as to modernizing propositions within the first 10 days of its establishment. Small contractors, such as heating concerns that rarely if ever before have advertised, have placed special advertising cards in the newspapers backing the movement, most of them referring to modernizing and repair work, or quoting their specialties.

A number of oil burner dealers have taken the opportunity to advertise more extensively, putting forth the argument that now is the time to have one's heating system completely modernized, and offering oil burners on terms of no down-payments with easy monthly installments. They are also pushing their campaigns to secure new retail outlets in communities previously not represented on their lists.

Arvedon Brothers, operating a number of big heating, ventilating, and plumbing supply stores, with electrical home supplies, have developed a financing plan of their own for modernizing and reconditioning homes that is unique, in that it dispenses with red tape and delays so that the applicant can get his loan in 24 hr. with one to two years to pay off the loan and only a small carrying charge. Terms are arranged to suit his circumstances.

The borrower is expected, of course, to buy the necessary materials from Arvedon's, as far as their stock of merchandise covers his requirements. They make no installations and handle no labor. This is turned over to one of a group of contractors who make their headquarters with Arvedon, all qualified in their fields, and the customer makes his contract with them.

Springfield—Springfield heating contractors are cooperating in every possible way with the Federal Housing Administration program. They are unanimous in their opinion that the new program will provide a setup which has long been needed.

So far there has been very little real work as a result of the government's plan, but contractors feel sure that there is plenty of business on the way.

Approval by the state emergency relief administrator of a project to hire 40 canvassers to place the Federal Housing campaign definitely in the home is expected to be announced soon, Judge Thomas C. Malley, chairman of the Springfield Better Housing Committee, reported after a meeting in Hotel Stonehaven.

Michigan

Battle Creek—A local newspaper, the *Enquirer and News,* by enlisting the aid of local banks, has begun an unusual drive on modernizing. The plan is outlined as follows: First, the paper secured from one of the local banks a list of homes which they own and would be willing to enlist in the plan. A likely specimen of 'old style house' that would be adaptable to modernizing and at the same time show the necessary contrast was then selected.

With this accomplished, plans were drawn for the modernizing program and still and moving pictures

were taken of the house inside and out. Further pictures will be taken during construction. Builders, supply houses, and contractors were invited to participate in advertising.

Each participant is advised that his bid must be at cost or less and that he will receive from the bank a certificate of participation for the amount of his accepted bid. When the house is sold he will receive this amount from the bank.

Upon completion, which will include stocking of fuel in the cellar, the home will be opened to the public for inspection—not as a model home but as an example of the modernizing possibilities for all homes. A competent woman will be in charge and she will point out to visitors the individual features of modernization, approximate costs, advantages, etc. Her audiences will be enlarged by a club plan of operation from Monday to Friday in the afternoons, by appointment invitations to women's organizations and church clubs. They will be taken on a tour of the house with an intelligent discussion and explanation of each phase of work done and shown movies and still pictures. At the conclusion, these women will be given the opportunity of carrying out their program of club activities and later will be served tea and cake.

It will be the responsibility of the woman in charge to register each visitor and to be alert to record any expressed interest in any particular part of the modernization work.

The house will be offered for sale at the cost price from the opening day and sold at the end of the 60 days allotted for inspection to the person bidding highest above the cost figure set, furnishings and all.

Detroit—The FHA's huge modernization program is just getting under way in Michigan, directed from the recently established office on the 11th floor of the National Bank Building. The Detroit office has been besieged by requests for information from associations, banks, dealers, contractors, engineers, and individuals wishing to benefit under the plan.

Early in September, almost as soon as the program had been announced, national manufacturers of heating and ventilating equipment in Detroit began newspaper and direct-by-mail campaigns to interest homeowners in the modernization plan. First of the large manufacturers to open campaigns here was American Radiator Company. Scores of applications have been received at the Detroit sales branch of this company for utilizing the plan, and many of them are nearly ready to begin installation of new heating plants, according to J. W. Armstrong, branch manager.

Another company which is doing its utmost to make the plan profitable to its contractor-dealers is The Crane Company. Detroit branch manager J. H. McCann is conducting meetings throughout the state for his dealers and is aiding them to secure applications.

Missouri

St. Louis—A Modern Home Exposition, sponsored by the city and endorsed by the Chamber of Commerce, will be held in the new Municipal Auditorium November 10-18. Contractors, building supply dealers, and architects, eager to share in the estimated expenditure of $15,000,000 for home modernization under the provisions of the National Housing Act, have already engaged one-third of the auditorium's exhibition space.

A better housing program will be undertaken in connection with the exposition by the Chamber of Commerce which will have 1,000 house-to-house canvassers to stimulate interest in home improvement.

New Jersey

Camden—The FHA director in this district reports that loan applications received in two weeks approximated $100,000.

Committees of various building industries, contractors, supply houses, etc., are being formed and the Camden County Chamber of Commerce is planning an intensive survey and advertising campaign.

Automatic home heating and air conditioning for home, office, and factory was exhibited and demonstrated at the Electrical Exposition, September 25-29 in Camden Convention Hall under the auspices of the Electrical League of South Jersey. One of the features of the show was the cooperation by members of the Electrical League of South Jersey with the Federal Housing Administration to bring about home improvement.

Hackensack—A cooperative effort on the part of heating contractors and the banks of Bergen County toward the National Housing Administration's modernization program is being made.

E. L. Clark, official of the City National Bank and Trust Company asserts that loans under the modernization program are good business, but only where the banker recognizes and carries out his obligation to examine each loan made on its merits.

"We are ready to go along 100% on these loans, within the regulations laid down by the government for the administration of them," asserted Theodore Ackerson, cashier of the Bergen County National Bank. "The government has set up certain requirements that must be met, and even under these regulations the responsibility for proper examination of each application still rests upon the bank making the loan."

Reply to a criticism that banks would not cooperate was offered in the form of a letter from Roger Steffan, director of modernization credits of the National Housing Administration at the Peoples' Trust Company. When asked for his bank's reaction to the criticism, A. E. Koeppel, secretary-treasurer, offered the letter which read, in part: "Your bank is making a good showing in reporting loans to the Federal Housing Administration. Evidently your institution knows how to handle these applications and is interested in doing so."

Alexander Jones, vice-president of the Hackensack Trust Company asserted: "Banks generally are glad to make loans. That is why they are in business. But they are not going to put the money out without some effort to comply with the government's requirements. One of these is that the person to whom the loan is

made shall have been working for a definite period of time when the application is made.

Ridgewood bank officials, where no applications for loans have been received, decided to "reserve comment until such time as we have received an application and are required to meet the issue."

The Rutherford National Bank received "a flood of inquiries about the modernization loans, but only six persons have made applications." Of the six, four have been granted while the other two were "declined for very obvious reasons."

"During the first two weeks of the modernization program," explained A. P. Luscombe, executive vice-president, "we received not a single application.

"Response has not been eager. People haven't had time to get acquainted with the program and they are cautious about spending; which, in the final analysis is what this means," he said.

Heating contractors and oil burner dealers are doing everything possible to get homeowners to take advantage of the government's offer.

Jersey City—A publicity campaign to promote the objectives of the Federal Housing Act was discussed at a meeting of the Better House Campaign Committee here September 27. It was decided to seek the cooperation of building contractors and business men in the raising of the $3,000 fund which the executive committee has decided is necessary to carry on the local work. Harry F. O'Mealia, chairman of the publicity and advertising committee, has arranged for talks to be broadcast from WAAT and WHOM.

The question of taxes was discussed, and the opinion given that repairs or replacements on buildings would not mean an increase in taxes, but that any additions would.

Newark—Members of the Heating & Piping Contractors New Jersey Association are planning ways and means of not only getting the work planned by householders who are applying for FHA loans, but also to show those who need new heating equipment how they may secure the finances so that their heating installations can be made.

So far there has been very little heating work done under the FHA modernization plan, but according to the Newark director many of the applications include new heating work.

Harry Geiser, secretary of the association, is enthusiastic over the possibilities for heating contractors and says that steps have been taken to outline a campaign method for members of the association.

In line with the FHA program, Charles Edison, regional head of the Federal Housing Administration, was the principal speaker at the recent opening ceremonies of the $14,000 model home built by the Elizabeth Chamber of Commerce near Ursino Lake.

Heating contractors are planning an advertising campaign, which will also include the idea of solicitors contacting prospects of the past two or three years, who, because of the depression failed to have work done that they had planned. These prospects, whose names have been shoved into the back of the file, now assume real importance if they have already or can be induced to secure loans under the FHA plan.

New Brunswick—Practically every contractor in the city and vicinity attended the meeting of the executive committee of the local campaign in Hotel Klein and heard Charles A. Anthony of the FHA stress the need for cooperation between banks, building and loan companies, and all branches of the building trades.

Robert Carson, general chairman of the local better housing homes campaign, who presided, said he "felt most optimistic about a general loosening of bank credit throughout the country which will allow the banks to loan much more freely in connection with the modernization program."

The committee announced the retention of Harry Edgar, a man well known in local banking circles, as campaign manager. Mr. Edgar's services, it is felt, should do much to make the program a success.

New York

New York—Most of the activity in connection with the FHA's program in this city is taking place in the outlying and suburban territories, since residences in the city limits are principally apartments. However, several of the larger daily papers are featuring sections devoted to classified advertising of contracting and supply houses. Practically all of the major oil burner, air conditioning, and similar companies have put on drives or are featuring FHA cooperation in their advertising. In Queens, one newspaper is running a modernizing page each week.

The National City Bank of New York has loaned nearly three-quarters of a million dollars for home renovation. Up to September 25, loans had been made to 1005 property owners. Over one-third of this money has gone into Brooklyn.

James A. Moffett, FH Administrator, who opened the Electrical and Radio Show at Madison Square Garden during September, declared that he expected to have the plans regarding Title 2 of the FH Act under way by October 1. The FHA had a large booth at the Electrical Show where visomatic pictures were shown and booklets and literature distributed to the quarter of a million visitors attending the show.

Ohio

Cleveland—Final touches are being made in the organization of Cleveland's Better Housing Campaign preparatory to opening the drive this week for a sweeping increase in home repairing, remodeling, and improvement under the provisions of the National Housing Act. Campaign committees report interest and cooperation among the building industry and allied lines at a high pitch. Interest on the part of the public is evidenced by the inquiries received at the district offices and the slowly mounting number of loans made by the banks for renovizing.

The finance committee, which is raising a budget of $40,000 to conduct an advertising campaign for better housing, reports that it is getting a hearty response from concerns solicited.

(Continued on page 37)

ON THE FIRING LINE

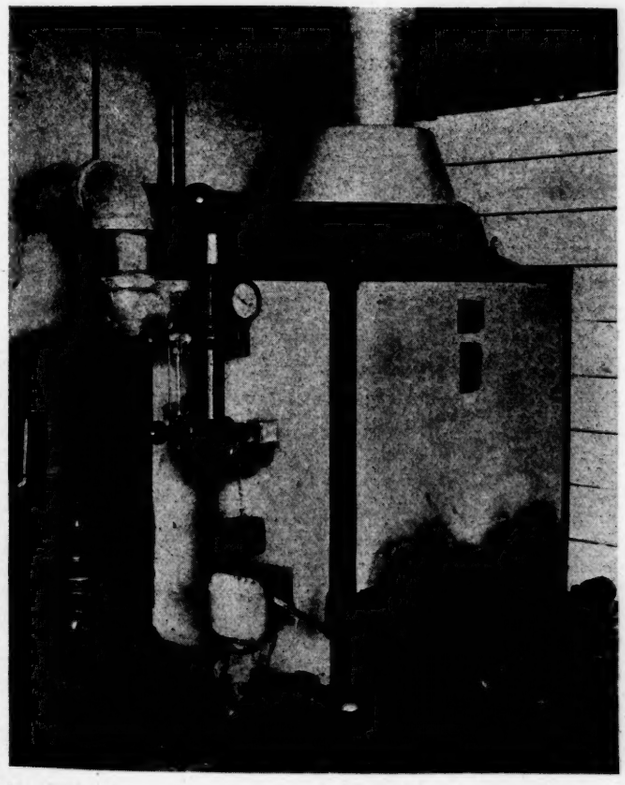
Practical, usable, and result-getting methods and experiences in getting business

Gas Heat as a Modernizing Lead

Gas heating might seem to run too high in operating cost, as compared with solid fuel, to permit using it as a leader for modernizing work, but one contractor in a suburban town finds that it fits into the program admirably. Because of this, the depression has meant little or nothing to this contractor. Actually, about the only effect the times have had for him has been a narrowing of the list of eligible owners. Instead of 1000 potential owners to be interested in gas heating, say, the list has been reduced to about 750. But the names remaining are proving as likely as the larger number previously.

He finds that mounting costs of oil, combined with increasing desire for automatic, clean, and odorless heating have paved the way for gas heating in many buildings not previously considered suitable. For instance, manufacturing establishments represent excellent prospects for gas-fired unit heaters. Some of his best and most prided installations have been in this kind of building.

In getting gas heating into residential and small non-residential buildings this contractor finds the easiest way is to approach the subject through promoting roof, wall, and floor insulation. It is his aim to make insulation so reduce the fuel cost with gas that people who order the former do not find gas excessively high. He does not handle the insulation end himself, preferring to maintain close contacts and commission arrangements with several good insulation contractors who are brought into the transaction according to location, quality of workmanship, and prices usually asked by them.



Installing gas heat furnishes many modernizing opportunities

Another influential factor in his work is the assistance of local gas companies. These companies not only turn over the names of many owners acquired in their show rooms and from their inspectors and appliance salesmen, but smooth the path in many ways. These include advertising, furnishing free booklets, salesmen collaboration, credit aid when needed, inspection, warehousing, etc.

He finds though that the best jobs come from satisfied customers. Shortly after installations have been made someone from this firm gets in touch with the owner and obtains names of friends, neighbors, and relatives who may be interested. No rewards for such assistance are offered other than periodical inspection and adjustments, if needed. This method of "call-backs" frequently results in additional work such as installation of time-set thermostats and other appliances. Leaving his completed jobs strictly alone never has been this contractor's policy, for he finds that service calls are the best possible key to new work.

It also is a part of the policy not to become strictly tied to any one style or make of heating apparatus. If an owner wants a gas-fired warm-air system, or if he prefers hot water to steam or vice versa, or if air conditioning is wanted, this policy permits the contractor to meet the wishes of the owner.

Still another good feature of this firm's work consists of modernizing old heating systems as to piping, radiators, vents, traps, and whatnot. One job leads to another. New boilers usually mean the necessisty of remodeling piping and radiators so that the new plant can provide the good results expected but which could not be supplied unless the improvement of the existing heating system were to be made at the same time.

Another feature has been the success at keeping credit risks at a minimum. No owner believed to be unable to afford gas heating is solicited. All work and materials usually are paid for within 30 days after completion and more often in this high-class suburban town cash payments are received when the work is done. Should financing be necessary such contracts usually are placed in the hands of the gas company, who thereupon pays the contractor at once and carries the time paper.

Firm—Russell Henderson, Maplewood, N. J.

Room Coolers and Air Conditioning

Cooling and air conditioning may not seem to some to offer an attractive opening for modernizing. So doubters may see, here is the story of a firm that has found work of this kind during the present year. It has included both room coolers and comprehensive duct systems.

The head of the firm is of the opinion that room coolers lend themselves admirably to present modernization plans in that they open the way in cases where conditioning is desired but funds available are small. He points out that although the individual cooling capacity of single units is not great, more can be added as money to pay is available, so that over a period of several years, perhaps, one can have the required number of units to enjoy all the benefits.

No single variety of "conditioning" is omitted in the work of this company. For example, several forced-fan type warm-air furnace plants with filters and provision for the addition of air washers and refrigeration at a later date have been installed as well as a few complete units possessing all the foregoing features.

Like most bona-fide heating and ventilating engineers and contractors, this firm likes best to put in complete air conditioning, but just at present feels that it is good business to get in as much of the complete system as can be sold and paid for. It is felt that later on incomes will be adequate to provide complete systems.

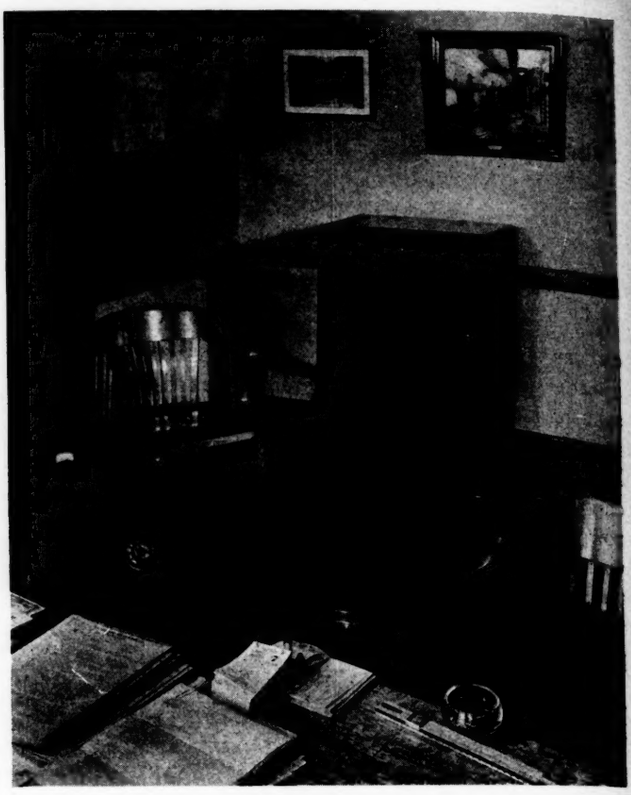
Field methods used include personal solicitation and those called on among others are banks, building and loan associations and mortgage companies who are known to have assumed title to considerable foreclosure property. Such organizations admittedly have the money to pay and are anxious to modernize captured buildings for sale and rental purposes.

Next in line of daily calls—this with special reference to "spot-coolers"—come undertaking parlors, restaurants, dance halls, auditoriums, and like places where air conditioning, particularly cooling, by attracting additional customers, reflects profit to those who own and operate such improvements. The commercial field in general has been found to offer good air conditioning possibilities.

This firm also likes air conditioning for another reason, namely, because there appears to be less competition here than in some other lines wherein partially trained dealers can successfully compete on a price basis. Experience demonstrates that technical training is necessary to handle air conditioning jobs successfully. This eliminates unauthorized would-be bidders and opens a smooth path to heating contractors and engineers.

In making solicitations this contractor first discusses air conditioning in general until he finds out about how much the owner wants to spend, how exacting are the demands as to performance, whether he wishes merely summer cooling or heating, filtration, humidification and air circulation besides. Judging from the attitude of the owner one is then in a position to offer the type of apparatus most likely to appeal.

The head of the firm does not believe in making apparatus agency connections so inflexible as to be excluded from quoting on definite kinds of equipment when it is apparent that such would best fulfill requirements. It occurs frequently that owners are given several alternates from which to select. To explain, the typical proposal may include prices for Equipment A, for Equipment B, and still another figure if Equipment C is to be furnished. From these proposals the owner can surely find the plant that suits his tastes and his wants.



Room coolers lend themselves admirably to present modernization plans

The disagreeable part about such a method is the surplus estimating that must be done before proposals are submitted. Hence, figures are bulked as much as possible, and rule of thumb methods are employed as largely as possible. It is held that experience is valuable in this plan because contractors thus can present round figures known to include suitable profit, without being too precise in item-to-item estimating. Time enough for this when orders appear live enough to be signed. All heating contracts, however, are certified.

Firm—T. B. Cryer Co., Newark, N. J.

●

Modernizing with Boiler and Radiator Replacements

Here's how one enterprising firm has taken advantage of the situation which combines the huge potential of modernizing work with the appearance of appliances adapted for going onto just such jobs. It required planning, organization, division of work, and an attitude of going out after the job instead of waiting for it to come in, but the result is that repair and modernizing now makes up half the volume done.

Solicitation is built around the economy argument, and this has proved especially valuable in making boiler replacements. In the territory covered, this firm has found literally hundreds of apartment buildings, blocks of stores, greenhouses, and industrial buildings operating several small boilers. Presumably these were set up and placed in service from time to time as additions to property were made over a period of years. In some greenhouse ranges, for example, there are known to be no less than 16 boilers of about 50 hp. each, whereas two or three large modern boilers with a suitable regrouping of supply and return lines would accomplish fuel savings sufficient to repay the cost of substitution in a short time.

So attractive a field is this one of boiler replacement that this firm has succeeded in making an unusually large number of such replacements during the present season. In one case 13 small round boilers were removed and replaced by a single oil-fired boiler of capacity to provide the necessary effect. This particular contract was secured because of the attractiveness of the economy argument. In many more instances the advantages of oil-fired "matched" oil-burning boilers with fuel automatic control have been so impressive to owners that contracts have resulted.

This firm has also found that the cold weather of last year has helped in making people realize where radiators are short. As a result replacement of standing radiators has been a source of considerable business this season.

Field work in locating jobs is handled by this firm in a fashion worthy of note. Door-to-door solicitors are employed on a commission basis. Their sole work is to unearth likely owners who can be interested in heating modernization of any kind. Their appeal is a simple request to be permitted to make a survey to determine the need. Whatever leads they are able to get are then turned over to trained salesmen who proceed from that point. The final proposal is in written form, attractively prepared and bound in pasteboard covers.

Firm—Rubel and Jensen, Newark, N. J.

FHA Plan Takes Hold Slowly but Steadily

(Continued from page 34)

Under the leadership of James G. Caffrey, sales director of the Van Sweringen Company, the membership of the building industry is conducting a selling drive to obtain repair jobs and put to work the industry which has been idle for four years. This sales promotion group uses the cards filled out by the federal agents in their survey of 127,000 Greater Cleveland homes last spring to uncover renovizing prospects. A staff of 175 women, provided for by Federal funds, began October 1 a re-canvass of these cards with the purpose of broadcasting the details of the Better Housing Program and providing information about obtaining National Housing Act loans.

Pennsylvania

Harrisburg—The heating industry in this vicinity is anticipating a sharp upward trend as the Federal modernizing plan gets under way. FHA Loan Director Harper W. Spong reports that all banks under his jurisdiction, which embraces the eastern half of Pennsylvania, have been thoroughly instructed on how to handle the loans. "Anyone with a legitimate claim need not go without the loan desired," Mr. Spong said.

Members of the heating industry report only a few contracts on loans to date, but are optimistic as to the future. All local contractors report many inquiries about the modernizing plan. Advertising in local newspapers has not been very clear in explaining the plan and FHA news releases have not been given much space. Additional publicity would be helpful here.

Philadelphia—E. P. Simon, FHA director for the Eastern District of Pennsylvania, has only had his office in operation for about a month. Thirty out of the 38 counties under his jurisdiction are actively promoting campaigns, and he estimates that his district is 85% organized. A survey in 18 of his counties recently showed a total of 650 loans made, with 10,000 loans in the whole country.

Four of the larger banks here claim to be cooperating actively and making loans to their clients. They say, however, that people coming to them from other banks frequently complain of lack of cooperation, or misunderstanding of the plan.

Contractors are pushing hard for business both through their sales forces and through newspaper advertising. Some of the larger dealers are using quarter page advertisements in the daily newspapers; others use less space. Practically all of them are stressing the selling point of no down payment and low monthly installments running as long as three years if desired. Dealers and contractors report that they have many prospects who would like to take advantage of the National Housing Act, but they can not get the cooperation of the banks.

However, contractors and engineers do not seem to be particularly active in pushing the FHA plan, and companies that operate their own finance organizations are reaping the benefits while others have difficulty in getting loans, either through lack of cooperation by the banks, or misunderstanding of the requirements.

Rhode Island

Providence—Conditions in Rhode Island are at present such that it is not possible to estimate the increase in the heating and ventilating business which will result from the operation of the FHA. The textile strike created a degree of uncertainty which had a serious effect upon all business.

A number of concerns in the heating and ventilating business have been doing everything possible to increase volume through the FHA plan. Where the financing is being done by the manufacturer or other independent financing organization, the results promise to

(Continued on page 66)

Chicago's Newest Technical High School Teaches Air Conditioning

ARE heating, ventilating, and air conditioning suitable subjects for high school courses? Colleges and universities have hitherto largely monopolized them and high schools, even those of the technical type, have found little place for such courses.

Now comes the new Lane Tech[1] building at Chicago with a laboratory for studying these subjects. Not yet equipped, if present plans carry through it will include a set-up of equipment which will put many college instructional laboratories into a secondary position.

Student popularity has much to do with the apparent success or failure of newly introduced courses. If this is any permanent indication it can be concluded already that the new courses are justified, for since they were announced there has been a rush of inquiries to learn more about the details. Twenty letters a day were not unusual.

Many had formed the impression that the courses were to be offered separately, although the present plan is to offer them only to regularly enrolled students taking four-year courses. Neither is it planned at present to offer them during the evening. The courses are to be given in two semesters, five periods of 45 min. per week. C. E. Lang, principal, has taken an active interest while H. C. Gotschall is the instructor in direct charge.

Technical high schools are based on the "learn by doing" idea and their laboratories are the heart of their instruction. With this in mind it is not surprising that in its early planning the laboratory equipment proposed for the new school was estimated to cost over $1 million. In order to reduce this and to have the benefit of suggestions from those active in the several lines, a series of committees was organized to consider the problem of just what equipment items should be included in each laboratory. As a result of this the laboratory equipment in the whole building is estimated at $650,000, instead of the original million. Of this total that which is to go into the air conditioning laboratory is estimated at only 1%—a truly modest expenditure.

When the committee[2] appointed to consider the air conditioning equipment reported, it recommended that apparatus of the familiar "central" type be set up with observation panels and with indicating and recording instruments as well as adequate automatic controls. This plant to consist of a fan with variable speed motor (2000 c.f.m. at 1¼ in. s.p.), steam supplied tempering heater, dry type air filter, washer with ejector water heater for humidification, three-ton refrigeration compressor with necessary appliances, direct expansion heat absorber and dehumidifier, and reheating coil. In addition, a one-ton cooling unit connected to the refrigeration compressor, and two small dust and fume or vapor separators are recommended.

This equipment is to be located in one end of a room 45 ft. by 60 ft. which is the space provided for seating. Adjoining this main room is a smaller one to which the air conditioning equipment will be connected with a supply near the ceiling and return from the floor. Thus, the general heating plant of the building itself is not used for the instructional work and its normal operation need not be upset by laboratory classes.

While the new laboratory is perhaps the most unusual and interesting feature of the building, the regular heating and ventilating plant is itself of more than passing importance to anyone who likes to keep up to date on what is being done in school practice.

While it is easy enough to simply state that the new building is the largest yet built[3] for high school purposes, this does not give a good indication of its size. The photo accompanying shows the extent, and this is further strengthened by noting that the plot on which the building stands is of 30 acres. There are 65 classrooms, 20 laboratories, 25 drawing and art rooms, 45 shops, an auditorium seating 2300, conference rooms and offices, lunchrooms and cafeterias with seating space for 1150 at one time, and all the other service requirements for a student body of 7000. At peak load the heating plant is expected to generate over 100,000 lb. per hr. of steam. Over 13 car loads of heating surface went into the building, along with 400,000 lb. of galvanized sheet and angle iron for the ductwork.

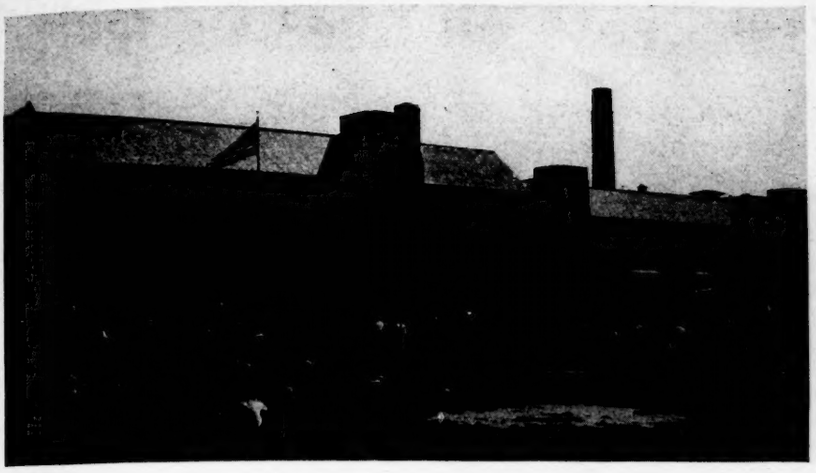
Coal is the fuel and the four water tube 600-hp. boilers are equipped with chain grate stokers, capable of handling Illinois coal. Heating is by direct radiators, central fan and duct systems, and by unit heaters and ventilators. Of the 12 central fans some are driven by electric motors while others use steam engine power. They handle a total of 500,000 c.f.m. in units varying from 25,000 to 75,000 c.f.m. Twenty-eight motor-driven fans exhausting through the roof extract air from toilets, lunchrooms, dressing-rooms, and kitchens in order that odors may not get into the classroom air handling system. Thirty-seven motor-driven unit heaters and ventilators are located in various rooms to meet conditions peculiar to these spaces. Automatic temperature control and humidification sufficient for keeping 40% during the winter are also included.

John Howatt, chief engineer of the school board, not only had charge of the heating and ventilating planning along with that of the other mechanical equipment, but he also took an active part in promoting the idea of a laboratory and in designating the equipment for it.

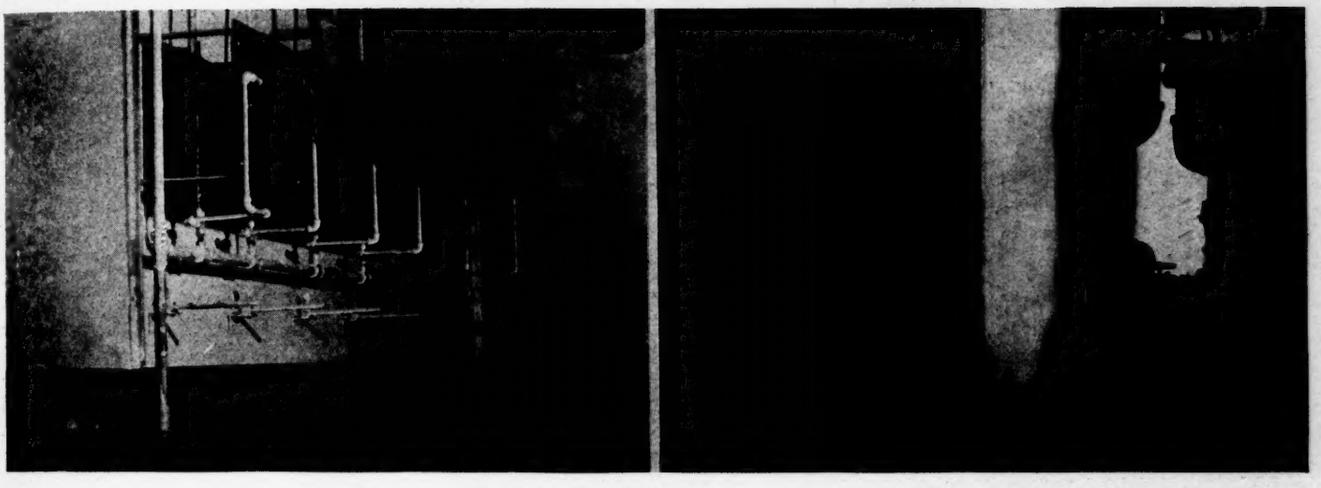
[1] Popularly so called, officially the Albert G. Lane Technical High School at Western Avenue, and Addison Street. Named for an early school superintendent of Chicago who advocated manual and technical training.

[2] Members as follows: E. P. Heckel, S. R. Lewis, John Aeberly, H. O. Berg, John Howatt.

[3] If the Chicago newspapers may be believed.



Mechanical Equipment in Lane Technical High School



(Left) Five pneumatically-controlled diaphragm motors for controlling dampers. Five protruding steel rods are for setting the fixed dampers. (Right) Piping and valves for supplying steam to and removing condensate from reheater coils in the plenum chamber.

(Left) One of the 12 main engine and fan units for ventilating. (Right) A battery of 4 water tube 600-hp. boilers equipped with chain grate stokers for burning Illinois coal.

NRA Gets New Lease on Life; Codes

are being rationalized; Oil Burner Code Authority elected; other codes quiet.

SEPTEMBER was an eventful month for NRA. Activities were not those affecting any single industry but the Recovery program in general. These are so important, may be so far-reaching, that they transcend, even for a given industry, the moves made along specific code lines.

Of the major developments, three stand out prominently:

(1) General Johnson's resignation as Administrator, to take effect October 15;

(2) Appointment of two[1] of the three agencies which will direct NRA;

(3) Emphasis by the White House that President Roosevelt himself will have the last word in NRA, and

(4) The definite statement of policy by President Roosevelt that NRA would be "a permanent part of government."[2]

Of general interest to industry, of particular concern to manufacturers:

(1) Doubt expressed by the President that small employers should be held to same restrictions as large employers.[3]

Although not so widely publicized as the questionnaire submitted to the President by the U. S. Chamber of Commerce, a questionnaire sent to NRA by Code Authorities (from all types of industries) asking enlightenment on 10 major problems of one kind and another showed plainly the problems faced by these bodies.[4]

Rationalization of codes has begun in earnest. Textile, Chemical, Public Service, and Basic Materials industries were announced (during the last month) as being realigned to conform to a fundamental classification. This plan, expected to facilitate administration, has been extended to include a Manufacturing and Equipment Division, which includes 416 basic and supplemental codes, including those of heating and air conditioning equipment manufacturing groups. So far as is reported from Washington, this move will have no immediate effect.

While general developments came thick and fast, heating industry code news last month was meager. Activity in these codes was principally as follows:

Oil Burner—The Oil Burner Code Authority, elected by letter ballot and effective October 1, now consists of nine members, five being representatives of manufacturers in the industry, and four dealer members of the industry.[5]

Manufacturers' representatives elected to the Authority are: J. A. Lattner, Century Engineering Corp., Cedar Rapids; A. J. Fleischmann, May Oil Burner Corp., Baltimore; Nelson S. Hayward, Ray Burner Co., San Francisco; J. J. Donovan, General Electric Company, and one other member, as yet not named.

Dealer members are: Alfred Buckley, Buckley & Scott, Inc., Providence, R. I.; Ray S. Porter, Belden-Porter Co., Minneapolis; M. M. Oppenheimer, Oil Heat, Inc., Baltimore, and A. Michael, Pacific Century Co., Portland, Ore.

The organization meeting of the Code Authority will be held in New York, October 1.

Valve & Fittings—The executive committee of the Code Authority for the Valve & Fittings Manufacturing Industry has been designated by NRA to handle trade practice complaints. The committee consists of Howard Coonley, chairman; Alex Jarecki; C. H. Kennedy; E. H. Blywise; George M. Naylor, and Robert E. Bryant.

Steel Boiler—The Steel Tubular and Firebox Boiler Industry has asked for approval of its budget of $15,750 covering the period of July 1, 1934 to July 1, 1935. The rate of contribution, which will not exceed one-half of 1% of total annual sales, will be based on the number of square feet of heating surface shipped.

Steam Heating Equipment—The Steam Heating Equipment Industry has submitted an application to NRA, asking for exemption from Administrative Order X36,[6] and has submitted its budget for approval. The budget for the period from July 1, 1934 to June 16, 1935 is $15,000, based on an assessment of 2 cents on each thermostatic trap, 5 cents on float and thermostatic traps, 1 cent on radiator supply valves and $1 on boiler return traps.[7]

Air Filter—The Code Authority for the Air Filter consists of H. C. Murphy, American Air Filter Co., Louisville, Ky.; J. L. Harpham, Independent Air Filter Co., Chicago, and O. H. Wechsberg, Coppus Engineering Corp., Worcester, Mass. However, this Code Authority membership has not yet received NRA approval.

Air Valve—The Code Authority of the Air Valve Industry was approved August 24 and consists of the following:

W. K. Simpson, Hoffman Specialty Co., Waterbury, Conn.; G. E. Cage, American Radiator Co., New York; J. L. Dole, Dole Valve Co., Chicago; R. H. Hubbard, Beaton & Caldwell Manufacturing Co., New Britain, Conn.; A. H. Magee, New York Air Valve Corp., New York; C. M. Olmsted, James P. Marsh Co., Chicago; H. W. Reis, W. A. Russell & Co., New York; and A. E. Bastedo, Burnham Boiler Corp., Irvington, N. Y.

The Administration Member is Francis E. Lee, Flushing, Long Island, N. Y.

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[1] National Industrial Recovery Board, the executive board, composed of two representatives of business (S. C. Williams and A. D. Whiteside), one representative of labor (Sidney Hillman) and two law experts and college professors (L. C. Marshall and W. H. Hamilton); Industrial Policy Committee, which will lay down policies, formulate legislation for NRA continuance after June, 1935, composed of NRA's general counsel Donald R. Richberg, Secretaries Ickes and Perkins, AAA Administrator C. C. Davis and FERA Administrator Hopkins. The third agency, for handling code violations, disputes, and enforcement, is not yet named.

[2] "We shall watch carefully the working of this new machinery for the second phase of NRA, modifying it where it needs modification and finally making recommendations to the Congress in order that the functions of NRA which have proved their worth may be made a part of the permanent machinery of government."—*President Roosevelt, in his radio address September* 30.

[3] "We also question the wisdom of extending code requirements suited to the great industrial centers and to large employers, to the great number of small employers in the smaller communities."—*President Roosevelt, in his radio address September* 30.

[4] The 10 questions, briefed:

(1) Would it not constitute sounder administrative policy to first submit to the Code Authority of the industry affected proposed modification of the code for the industry, instead of effecting changes by unilateral action of NRA?

(2) Why is it not possible to eliminate the interminable intervals that at present delay NRA approval of budgets, interpretations and explanations?

(3) What plans are there to assist code authorities which spend money and then find their efforts stultified by failure to approve budgets?

(4) Does NRA actually intend to enforce codes?

(5) Is it sound administrative policy for NRA to answer important questions from industry members or modify or veto a Code Authority action, without first consulting the Code Authority of the industry involved?

(6) May division or deputy administrators modify an announced NRA policy by refusing to accord to an industry the benefit of such policy?

(7) Is the employment by Code Authorities of a technical staff objectionable to NRA?

(8) Are codes intended to apply to government operations producing the same product as an industry covered by a code?

(9) Will not the order permitting a 15% differential for government bids weaken the wage structure of the recovery program?

(10) Can you state anything definite about the continuance of NRA after June, 1935, and whether any renewal program contemplates the retention of trade practice and price-cutting regulations, as well as labor provisions?

[5] The members hold office for one year from October 1, 1934.

[6] Which requires that members of an industry need not support codes other than that dealing with their principal line of business.

[7] This scale was arrived at after study of the reported 1933 sales volume of 12 members of the industry who do more than 80% of the total volume of the industry.

Who's Who in the Heating Contractors Code Authority

▼

ROBERT D. WILLIAMS
(Chairman; Association Member)

Vice-president, Baker, Smith & Co., Inc., New York. Born at Allegheny, Pa. Educated in the public schools of New York. Has been associated with Baker, Smith & Company for 40 years. President of the H.P.&A.C.N.A. for two years, director for six years, and served as director of the New York City association for past eight years, as its president for two years.

EUGENE H. HATTERSLEY
(Industry Member)

Graduate of Purdue University with the degree of B.S.M.E., 1915. Began his business career as an employee of Warren Webster & Company. Later became member of the firm of A. Hattersley & Sons, Ft. Wayne contractors since 1856. Mr. Hattersley took the place of the retiring senior member. Member of the Board of Directors of the Fort Wayne Chamber of Commerce.

MAURICE J. CHAGNARD
(Vice-Chairman; Association Member)

President, Crescent Plumbing & Heating Co., Louisville, Ky. Born in New Orleans, 1897; educated in New Orleans. Had two years of engineering in part time work at Tulane University and La Salle Extension University. Treasurer, H.P.&A.C.N.A.; member, Louisville Business Men's Club, Engineers and Architects Club; vice-president at the present time of the Louisville Building Congress; vice-president, Local Coordinating Committee for the Construction Industry.

J. LAWRENCE DENEILLE
(Association Member)

Secretary-Treasurer, Eichler Heating Co., Inc., St. Louis. Born 1893, in Jefferson City, Mo. Educated in Jefferson City grade school, St. Louis Soldan High School, and Missouri University. Entered business in 1914 with the Eichler Heating Company and was loaned in 1917 for the duration of the War as Inspecting Engineer at Camp Pike, Little Rock, Ark. President of H.P.&A.C.N.A.

GEORGE H. DICKERSON
(Association Member)

President, Mehring & Hanson Co., Chicago. Graduate of University of Illinois, B.S.M.E., in 1903. Was with the Powers Regulator Company for one year, seven years with D. H. Prentice Company, and since 1911 with Mehring & Hanson Company. Director, H.P.&A.C.N.A.; director, Chicago Master Steam Fitters' Association; member, Committee on Air Conditioning in both associations; president, Western Trade Golf Association.

ARCHIBALD A. MARX
(Industry Member)

Treasurer, American Heating & Plumbing Co., New Orleans. Born in New Orleans, 1870; attended the public schools of that city. Entered business in 1885 and was employed in concerns engaged in importing and manufacturing of table condiments. Entered the plumbing and heating business in 1900. President of the National Vinegar Co., Houston, Tex.; president of Sternberger Bros., Inc., cotton merchants, Memphis, Tenn.; director, Union Homestead Association of New Orleans, and a member of the New Orleans Association of Commerce. He is also vice-president of B'nai B'rith, and treasurer of the Southern Jurisdiction for the last 22 years.

THOMAS O'CALLAGHAN
(Association Member)

Treasurer, Acme Heating & Ventilating Co., Boston. Born in Ireland, 1879. Attended Blackrock College, Dublin. Came to the United States in 1896, citizen in 1901. Was engaged in the wholesale wine and liquor business from 1900 to 1912. Was owner and manager of the Hotel Northampton, 1912-1920. Organized the Acme Heating & Ventilating Company in 1921, and is owner and treasurer. Member of board of directors of the H.P.&A.C.-N.A., and was director of the Boston association, 1925-33; was president of that association from 1930 to 31.

WRAY M. SCOTT
(Industry Member)

President and treasurer of the Wray Scott Plumbing & Heating Co., Inc., St. Louis. Born, Omaha, 1901. Educated in the public school and high school in Nebraska. Left high school to become an apprentice in an Omaha establishment, then saw service with the Sixth Field Artillery. After the War, became a steamfitter's helper and a journeyman in a year and a half, and worked as a journeyman until 1924 when he went into business for himself. Member of the Masons, Rotary Club, Omaha Chamber of Commerce, and National Association of Master Plumbers. Served four years as president of the Nebraska Retail Plumbers Association, and has held all offices in the Omaha Master Plumbers Association.

JOHN H. ZINK
(Treasurer; Association Member)

President, Heat & Power Corp., Baltimore. Educated at Scotland Military Academy, Lehigh University, and Johns Hopkins. His business experience began in 1905 with the Cumberland Valley R. R. From there he moved to the engineering department of Frick Company, and then became assistant manager of the Ellis Co., Baltimore. In 1911 and 1912 he was plant manager for the U. S. Asphalt Refining Company, and from 1913 to 1916 construction manager for the Interocean Oil Co., Baltimore. From 1917 on he has been connected with The Heat & Power Corporation. Has served as president of Heating, Piping & Air Conditioning Contractors Baltimore Association for the past four years; is a member of the Reciprocity Club, Building Congress, A.S.M.E., American Welding Society, and representative of the H.P.&A.C.N.A. on the Policy Committee of the Construction League. During the past year Mr. Zink has been intimately connected with code affairs as a member of the Code Committee of this industry.

JOEL IRVINE LYLE
(Industry Member)

President, Carrier Engineering Corp., Newark. Born on a farm near Athens, Ky. Graduate of University of Kentucky. B.M.E., M.E., and LL.D. Began his business experience in the shops of the Pullman Co., Ludlow, Ky. From 1899 to 1908 was employed by the Buffalo Forge Co., Buffalo, N. Y., as sales engineer and then as manager of the New York branch. In 1908 became general manager of the Carrier Air Conditioning Company, and in 1915 became treasurer and general manager of the Carrier Engineering Corporation. In 1931 he was elected to the presidency of the holding company, the Carrier Corporation, and also the Carrier Engineering Corporation. Past president, A.S.H.V.E.; member, A.S.-M.E. During the War he served as a member of the Committee on Apportioning Domestic Fuel. Served eight years as trustee of the University of Kentucky.

WALTER KLIE
(Association Member)

President, Smith & Oby Co., Cleveland. Graduate of Ohio State University in Mechanical Engineering, 1903. Began his business career with seven years as sales engineer in Ohio, becoming president of Smith & Oby in 1910. Was president of H.P.&A.C.N.A. for three terms—1928, 1929, and 1930. Has been a member of the Board of Directors of the National Association for 10 years. Vice-president, Cleveland Rotary Club; director, University Club of Cleveland; member, Country Club of Cleveland; member, Cleveland Engineering Society; member, A.S.H.V.E.; past treasurer, Shaker Heights Country Club; member, Cleveland Chamber of Commerce; member, City Planning Committee. Served as president of the Building Trades Employers Association of Cleveland and served two terms as president of the National Association of Building Trades Employers, and as president of the Cleveland Association of Plumbing Contractors.

Field Tests Show Accuracy of Degree-Day Method

Tests on eight Atlanta homes show dependability of the degree-day method of predicting fuel consumption. Steam, hot water, gravity warm-air and forced circulation warm-air heating plants tested.

By RAYMOND C. BROACH†

THE degree-day method of estimating fuel consumption has been recognized as useful, particularly for central heating plants in residences. A fuel that can be burned automatically under conditions where accurate and complete records can be made throughout an entire heating season would be the most necessary factor in establishing the value of the theory. It is hoped that this report of actual fuel consumption by eight residential heating plants in Atlanta, Ga., during the season of 1933-34 will tend to show how dependable the method is. Unmixed natural gas having a heat value of approximately 1000 B.t.u. per cu. ft. was the fuel used in all eight of the plants being studied. Natural gas is served in Atlanta from the fields of Louisiana and Mississippi.

In selecting plants to use in this study it was decided that every generally accepted type of residential heating system should be represented. The selections fell first into two classifications; namely, those burning gas in boilers and furnaces designed for gas and those burning gas in boilers and furnaces designed for bituminous coal. Four selections from gas-designed equipment and four from conversion burner installations were made, each group of four representing the following general types of plants most commonly found in better heated homes.

†Heating Engineer, Atlanta Gas Light Company.

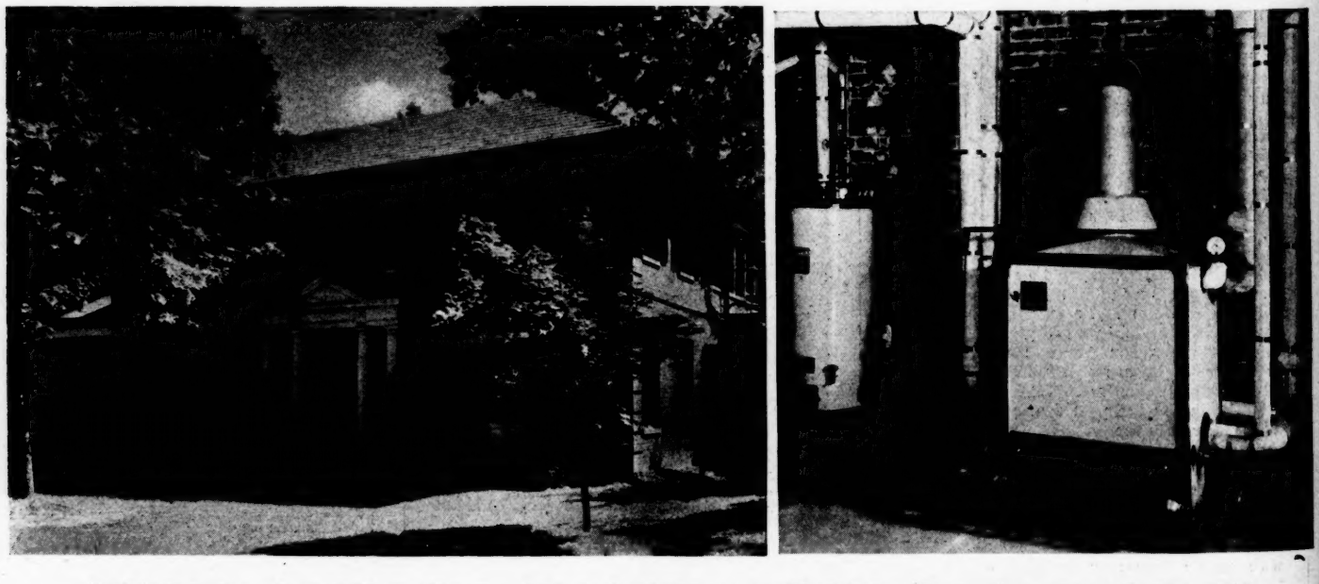
A. Steam or vapor with direct cast-iron radiators.
B. Hot water with direct cast-iron radiators.
C. Gravity warm air.
D. Forced circulation warm air.

All eight plants were chosen from the same meter reading district of the city so that the same degree-day totals for all monthly periods would apply to all. No plant was used where irregular meter readings were made or where it was known that the home was closed because of vacations. No very large nor very small homes were chosen and the eight may be said to represent the average in Atlanta. All of the plants are automatically controlled through a thermostat.

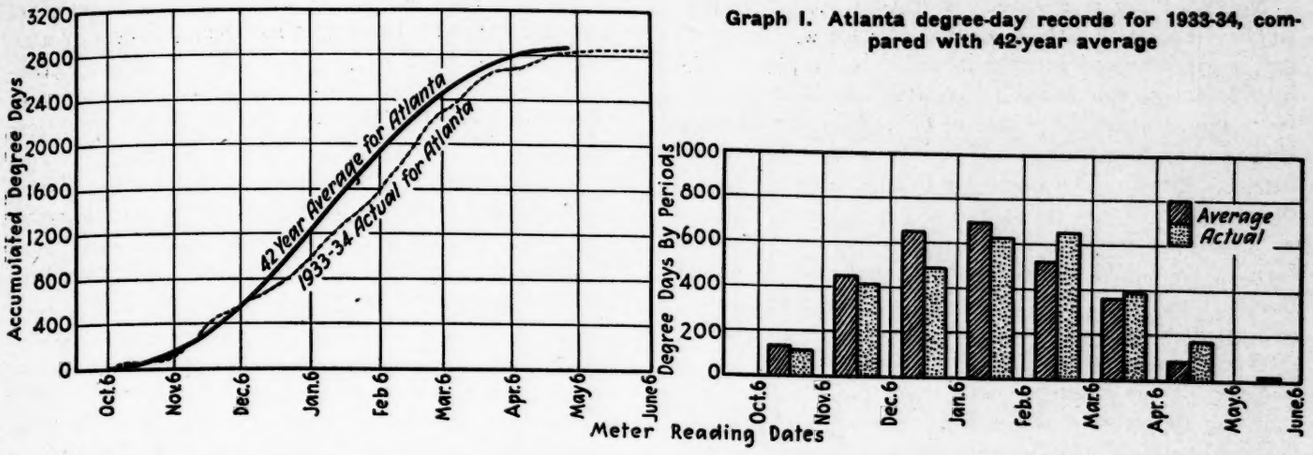
It should be stated that the comparative analysis developed in this report is not intended to prove advantages for any type of central heating over others, but the consistency with which all performed when fuel consumption is compared with degree-days.

For purposes of this paper the plants are numbered consecutively from one to eight in the order of their total gas consumption for the season of 1933-34. Following is a description of each.

No. 1. This heating system is a hot water plant. The hourly heat loss for a rise of 60° is 99,000 B.t.u. The boiler is gas designed and is equipped with a water temperature limit throttling control, automatic pilot, electric motor gas valve and plain room thermostat. The thermostat setting has been for 70° for about 16 hr. of the day and for 60° for the remaining



(Left) Exterior view of Home No. 1, which is heated by a gas-fired hot water system, shown to the right



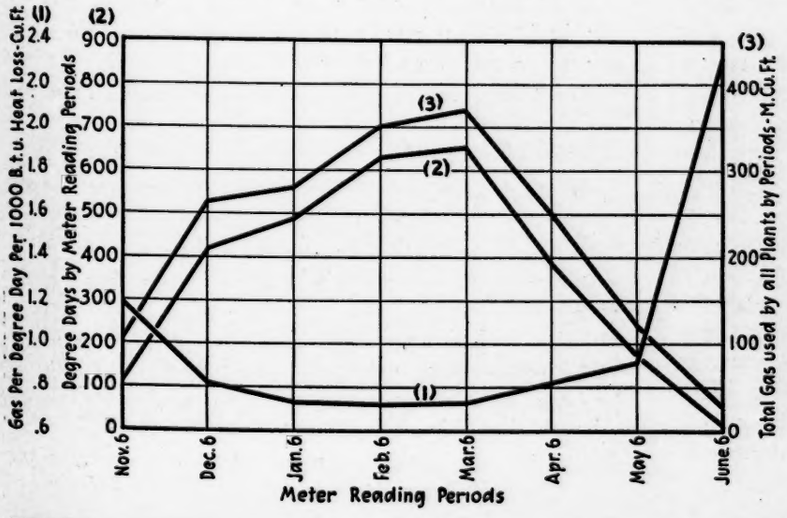
Graph I. Atlanta degree-day records for 1933-34, compared with 42-year average

eight. The piping is arranged in a two-pipe closed system with direct cast-iron radiators. The A.G.A. rating of the boiler is 1770 sq. ft. of equivalent hot water radiator measured at the nozzle. The radiators actually installed are 802.5 sq. ft., exclusive of piping. All piping is well insulated. In the design and installation of the plant special attention was given to provide for proper flow and the full utilization of a wide range in water temperatures, as varying weather conditions demanded.

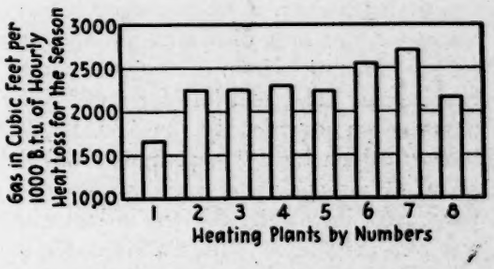
No. 2. This plant is made up of a gas-designed warm-air furnace, automatic humidifier with humidity control, plain room thermostat, automatic pilot, electric gas valve, spun glass air filters, blower and bonnet blower control. The hourly heat loss is 81,250 B.t.u. for a temperature difference of 60°. The furnace is rated by the A.G.A. at 112,500 B.t.u. per hr. at the furnace bonnet. Warm-air distribution is handled through a trunk duct system of standard design. Quadrant dampers are arranged for more perfect balancing of air flow. The thermostat setting has been for 72° and 60° for day and night, respectively. Relative humidity approximating 50% has been maintained for the day heating period. A constant speed, ¼ hp. motor drives the blower at 400 r.p.m., which delivers 1300 c.f.m. of air against a static pressure of 3/16 in. of water. A bonnet temperature of 130° is maintained during normal operation.

No. 3. This plant is a one-pipe steam system fired by a gas-designed boiler which is A.G.A. rated at 940 sq. ft. of equivalent steam radiator when measured at the boiler nozzle. The hourly heat loss for a 60° difference in temperature is 92,365 B.t.u. The installed radiator is the direct cast-iron type and totals 461 sq. ft. The boiler is equipped with a throttling steam pressure limit control, automatic pilot, low water fuel cut-out, electric motor gas valve, and plain room thermostat. Thermostat settings have been for 72° and 60° for the day and night periods, respectively. This plant may be called typical of the one-pipe steam heating system.

No. 4. This is a gravity warm-air plant made up of a conventional coal furnace in which a gas conversion burner is installed. The calculated heat loss is 96,070 B.t.u. per hr. for a 60° difference in temperature. The furnace has a combustion chamber diameter of 25 in. and a grate diameter of 21 in. The gas burner head is round and 17 in. in diameter. The burner was set to deliver 125,000 B.t.u. per hr. at the furnace bonnet. For a two-story house having 60% of the basement heat pipe area serving the first floor and 40% supplying the second floor, this furnace is commonly rated at 585 sq. in. of basement heat pipe area. There is actually installed a total of 727 sq. in. of basement heat pipe and 766 sq. in. of basement return air pipe. A drip filling water pan is attached to the furnace. The burner is equipped with automatic pilot, electric motor gas valve, plain room thermostat, and secondary air control. The thermostat settings have been for 72° and 60°, respectively.



Graph II. (Left) Relationship between degree-days, total and unit gas consumption for the eight plants. Graph III. (Below) Unit fuel consumption for the eight heating plants.



No. 5. Plant is a gravity warm-air system similar to No. 4 except that the coal-fired furnace was removed and a gas-designed furnace installed in its place. The heat loss was calculated to be 102,725 B.t.u. per hr. for a temperature difference of 60°. The gas furnace has an A.G.A. rating of 157,500 B.t.u. per hr. at the furnace bonnet. The warm-air basement pipe area for the two-story house totals 898 sq. in., while the return air basement pipe area amounts to 845 sq. in. The furnace equipment consists of an automatically filled humidifying pan, automatic pilot, magnetic gas valve, and plain room thermostat. Day and night thermostat settings have been 74° and 60°, respectively.

No. 6. This heating system may be said to represent the typical hot water heating plant. The coal-designed, cast-iron boiler is round and is rated by the manufacturer at the equivalent of 1065 sq. ft. of hot water radiator when measured at the boiler nozzle. It has a grate diameter of 23 in. and the round gas burner head is 17 in. in diameter. The direct cast-iron radiator, which is short of requirements, totals 553 sq. ft., exclusive of piping. The hourly heat loss for a temperature difference of 60° is 94,980 B.t.u. The burner was set to deliver 135,000 B.t.u. per hr. to the boiler nozzle. The automatic controls consist of an electric water temperature limit control, automatic pilot, electric motor gas valve, and plain room thermostat. Day and night temperatures have been 72° and 60°, respectively.

No. 7. A one-pipe steam heating system similar to No. 3 except that it has a gas conversion burner installed in a rectangular steel boiler designed for bituminous coal. The hourly heat loss is 91,850 B.t.u. when the temperature difference is 60°. The manufacturer's rating of the boiler is 750 sq. ft. of equivalent direct steam radiator at the boiler nozzle, with coal as fuel. The gas burner is set to deliver 140,000 B.t.u. per hr. at the boiler nozzle. The burner head is rectangular and was chosen to fit the furnace as snugly as standard sizes permitted. The direct cast-iron radiator installed totals 453 sq. ft., exclusive of piping. The burner is equipped with electric pressure limit control, automatic pilot, electric motor gas valve, plain room thermostat, and secondary air control.

No. 8. This plant is an illustration of how an unsatisfactory gravity flow warm-air plant can be made into a modern heating system that is both satisfactory and efficient. The recommendations of the local gas company were adopted and the system changed to forced circulation. Gravity flow pipes were removed and cleaned and minor changes made to better balance the layout. The coal-designed furnace had a combustion chamber diameter of 28 in., and its size, type, and condition were deemed suitable for use with a gas conversion burner. The two-story house has basement warm-air pipe area of 834 sq. in. and basement return air pipe area of 857 sq. in., after all minor changes had been made. The heat loss for a 60° difference in temperature was calculated to be 124,350 B.t.u. per hr. A blower driven by a ¼-hp. motor and delivering 1800 c.f.m. of air against a static pressure of 3/16 in. of water was installed. A bank of spun glass air filters was also installed. A drip filled water pan was a part of the furnace. By use of dampers in all heat pipes a good balance of the system has been achieved. Warm, moist, and filtered air at about 125° is evenly distributed when formerly there was much unevenness of heat distribution. The gas burner is set to deliver 165,000 B.t.u. per hr. at the furnace bonnet. The controls are made up of a bonnet control for the blower, plain room thermostat, automatic pilot, electric motor gas valve, and blower switch for summer ventilation. Temperatures maintained for day and night have been 72° and 60°, respectively.

Graph I shows the type of heating season Atlanta had during 1933-34 as compared with the 42-year average for the city. This average winter has 2876 degree-days between October 13 and April 26, while from October 7, 1933, to May 29, 1934, there was a total of 2850 degree-days.

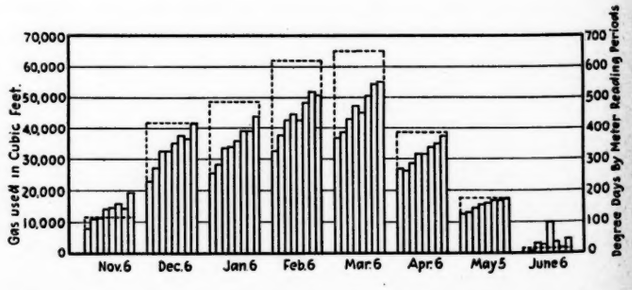
Gas consumption by monthly billing periods by all plants is shown in Graph IV. The consistency with which all plants follow the trend in degree-day totals from month to month is marked. The one exception is for the period of May 5th to June 6th. During this period one plant was shut down for the entire time and others operated with evident lack of balance. Only 14 degree-days occurred during the 32 days of the period and this small total was accumulated on 6 days.

Much confusion has resulted from the customary practices of rating heating appliances and heating systems. The unit for a steam system has been the square foot of cast-iron radiator supplied with steam at 2 lb. gauge pressure, with still air at 70° surrounding the radiator surface, which condition was known to give off approximately 240 B.t.u. per hr. Supplementary units had to be developed when it was desired to operate a steam plant over a range of steam pressures.

The unit of rating for a hot water heating system has been the square foot of cast-iron radiation supplied with water at a temperature of 180°, with still air at 70° surrounding the radiating surface. The heat emission under these conditions was 150 B.t.u. per hr. This definition had to be broadened also to care for conditions where water temperatures over a wide range were to be circulated.

In the field of warm-air heating the unit of rating has been less exact and even more confusing. The value commonly used for gravity circulation is the square inch of basement heat pipe, which is understood to supply 111 B.t.u. per hr. to the first floor and 166 B.t.u per hr. to the second floor.

Much inconvenience and misunderstanding have re-



Graph IV. Gas consumption and degree-day records for each of the eight plants by monthly billing periods

sulted from the lack of a common unit that permits of application to any heating system. For the purposes of this study a capacity to deliver 1000 B.t.u. per hr. into the space to be heated is the unit set up. Then, unit fuel consumption becomes the fuel used per 1000 B.t.u. of hourly heat loss per degree-day, or the time element may be lengthened to a full normal season if the use of the unit is to be limited to the one locality.

Graph III shows unit fuel consumption for all eight plants. The close agreement in unit fuel consumption by Plants 2, 3, 4, 5, and 8 is striking. A study of the descriptions of Plants 1, 6, and 7 will develop an explanation for their divergence from what appears to be normal unit fuel consumption. In Atlanta, each degree of temperature increase or decrease from 72° as an inside temperature results in a corresponding increase or decrease of approximately 0.05% in fuel consumption.

Plants 6 and 7 presented conditions which made the successful application of conversion burners more difficult. These conditions were recognized at the time the installations were made and estimates of fuel consumption were set up accordingly. However, the month-to-month fuel consumption of both is as consistent as any of the eight, as may be observed from Graphs II and IV. The experienced estimator can compensate intelligently for out-of-the-ordinary conditions that affect fuel consumption and general results.

Graph II presents an interesting summary of the season's operations of all eight plants. As might be expected, the two curves representing degree-days and total fuel consumption for all plants by monthly periods follow the same trend very closely. The curve showing average unit fuel consumption by meter reading periods is significant. The trend of this curve is consistently opposite throughout the season to the degree-day and total gas consumption curves.

In the September, 1933, HEATING AND VENTILATING a study similar to this but based on results obtained from an Atlanta office building, developed the same types of curves as Graph II shows. With only 2876 degree-days as the average season's total for Atlanta, the shape of the unit fuel consumption curve is more radical than would be the case for localities having a longer and more severe heating season. Interesting as this curve is its variations are easily explained. In the early and late months of the heating season the gas used by the pilot, which should be a constant quantity, becomes a larger percentage of the total gas used. Overheating or "over-running" of the thermostat is difficult to avoid in these mild months. From beginning to end of an average Atlanta heating season a properly balanced gas-fired residential heating plant operates very near to 1200 hr., or about 25% of the total elapsed time. In mid-winter months when this percentage of total time is highest unit fuel consumption is lowest.

An interesting fact was noted in Atlanta during the 1933-34 winter. The recording instruments of the U. S. Weather Bureau were located in the Bureau's offices on the top, or 14th, floor and on the roof of a large office building. The elevation above sea level at this point is slightly in excess of 1200 ft. On several winter nights when there was slight wind movement there occurred wide differences between the readings of the Bureau thermometer and unofficial thermometers located in the suburbs of the city. Many of these unofficial thermometers were at points where the elevations above sea level were as low as 850 ft. but a distance of only 4 to 6 miles from the Weather Bureau office. On one morning of the past winter the difference was reported as 22°. The explanation appearing most plausible was that the combination of a smoke cloud over the city and heat radiated from large buildings into a still atmosphere held the official temperature up, while the lower residential districts cooled more rapidly and were consequently blanketed by a stratum of denser and colder air.

While these facts are interesting it is not believed that they occurred often enough and in sufficient degree to have effected materially the reported degree-day total for the 1933-34 season. At any rate the operating results given in this report are from eight representative plants and are for a season that was as near normal for Atlanta as could be desired.

District Heating in Paris

IN the Gare de Lyon district in Paris there is a district heating system which extends for approximately five miles and serves a number of varied types of buildings. Practically every building in the district is served by the system. Among the buildings served are houses, hotels, baths, a railway station, offices, and restaurants. In the railway station not only are the buildings heated, but also trains while they are at the platforms.

Steam is generated at the central station at 112 lb. per sq. in. and is reduced to 30 to 85 lb. according to seasonal demands. The maximum heating requirements of the buildings served are approximately 12,000,000 B.t.u. per hr.

Distribution and return is by steam and condensate mains, insulated with a type of sectional covering and carried on roller supports in subways or small channels. The condensate in the mains is removed at various points throughout the system by drains and returned to the main condensate line. Either steam traps or dry vacuum pumps are used. In order to allow for repairs and additions to the system there are valves at various points which can be used to cut off sections of the system.

A stop valve, a reducing valve if necessary, a meter and automatic controls are located at the point where the steam enters the building. The steam company has no control over the heating arrangements of the building. In some special cases the condensate is not returned to the system.—*Chaleur et Industrie.*

Coal Selection, Capacity Checking, and Installation Hints for Small Heating Stokers

By D. LANDAU†

WHEN domestic stokers were first introduced it was believed that any coal could be burned, regardless of its composition. This fallacy was soon dispelled, not without much loss to both the maker and user.

The dominant characteristics which determine the fitness of a coal for stoker applications are high fusion ash and absence of caking. If a coal cakes readily, as do most of the bituminous coals, it is essential that some mechanical means be introduced to overcome this, as by agitation. If the ash fuses at too low a temperature the coal can not be used at all.

With hand-fired natural draft boilers, the combustion rate is low, and because of the introduction of large amounts of air the fire temperature is lowered. Thus, even a low fusing ash coal may do, and give from fair to very good results. Increasing the combustion rate decreases the air excess and raises the fire temperature so that the ash soon melts and produces clinker. The higher the fusion point of the ash, the more can we force the combustion rate before attaining the clinker stage. It follows that a coal which has performed well at one combustion rate may be entirely unsuited when the rate is increased. This fact has been known for a long time even to the layman. Any clinker which forms in a hand-fired natural draft boiler may be overcome in a measure by cleaning fires more frequently. With the stoker this defect is not so easily remedied. The clinkers slag into the retort, blocking the air passages and, sooner or later, the stoker comes to grief for want of air. If this slagging is strong enough it may even melt the tuyeres and rapidly destroy the castings by erosion.

In semi-bituminous coals like those of the Pocahontas or Central Pennsylvania field, the coal forms a very dense and resistant coke as soon as the volatile matter is driven off. Although their ash fusion point may be very high, the coke formed blocks the air and even prevents the feeding device from pushing coal into the retort in the case of the underfeed stoker. This coke mass must therefore be broken up by mechanical means, as by agitation.

Good stoker coal should, above all, have an ash fusing temperature of at least 2300°, since the hottest point in the fire often attains a temperature from 2500° to 2600°.

Fusion Temperatures of Ash

Ash in coals may be divided into two classes; (1) free ash and (2) fixed ash. The free ash is mostly formed of bits of clay, shell, slate, and pyrites which occur in the vein and fragments of the roof or floor of the mine. The free ash can be largely washed out by proper machinery. The amount of free ash varies considerably in different parts of the same mine.

The fixed ash is formed of the impurities existing in the coal itself and is disseminated freely and uniformly, amounting to 2% or 3%. Since this ash can not be removed from the coal it represents the minimum ash content of coal.

The finer materials, that is to say, the smaller coal lumps, contain larger percentages of all the ash varieties than do the big lumps of coal. Thus, a certain anthracite coal, the egg size had 4% ash, the nut size 9%, while the pea size showed as much as 15%.

The temperature at which an ash fuses determines the clinkering value of a coal. No general method has as yet been found of predicting the fusion temperature from the analysis of the ash. It is known, however, that the fusion point is lowered by increasing amounts of magnesia, lime and iron compounds, particularly the sulphides.

Classes of Coals

Coals have been divided into three classes with respect to the temperature at which their ash fuses. These classes are the following:

1. Coals which have a fusing temperature from 2600° to 3100°. These include the anthracites and the lower and older bituminous beds. Ash from these coals is refractory, giving no trouble from clinkering.

2. Coals having an ash fusing temperature from 2200° to 2600°, including in general the bulk of the Pennsylvania bituminous beds. Ash from these coals is of medium fusibility.

3. Coals having an ash fusion temperature from 1900° to 2200°. Such ash gives more or less trouble from clinkering and the coals cannot be used with any degree of satisfaction in stokers.

The Pennsylvania coals are, generally speaking, high fusion ash coals, the lowest running around 2300° and the highest over 3100°. A few West Virginia coals reach 2900° while Pocahontas coals attain between 2400° to 2600°. The interior province coal fields reach 2000°, or lower, except Santo Tomas, Texas, which shows 2580°. As a rule it may be stated that all low fusion ash coals have a high sulphur content.

One engineer, who has had considerable experience with stoker coals, has suggested that the anthracite may be placed in about the following category with respect to stoker use.

Pennsylvania Anthracite: Hard white ash. Ignites with difficulty, high in heat value, is a most valuable stoker coal and is particularly valuable for steam plants.

†Consulting Engineer, New York.

Schuylkill Red Ash Coal: Free burning, requires little draft and excellent for hand firing domestic use.

Shamokin Coal: Some is about the same as the last and other beds are hard burning. Some of these coals will not burn at all in small domestic stokers unless mixed with coals having higher volatile.

Lykens Valley Red Ash: Burns with a long flame, free burning and good stoker coal.

Lorberry Coal: Red ash and very little volatile.

Wyoming Red Ash: Similar to the Pennsylvania hard white ash except that it contains considerable iron oxides.

The eastern bituminous coals are divided into three categories according to the percentage of volatile. We thus have the following: high volatile, 32% to 41%; medium volatile, 21% to 31%; low volatile, less than 21%.

The high volatile from Western Pennsylvania, Eastern Ohio, Kentucky, and parts of West Virginia contain from 30% to 38% of volatile, 50% to 60% fixed carbon, 5% to 12% ash, 3% to 10% moisture, and from 13,000 to 14,000 B.t.u. per lb. of dry coal. These coals are not easy to burn without smoke because of the heavy hydrocarbons and tarry gases. They require much combustion space but give no trouble from caking.

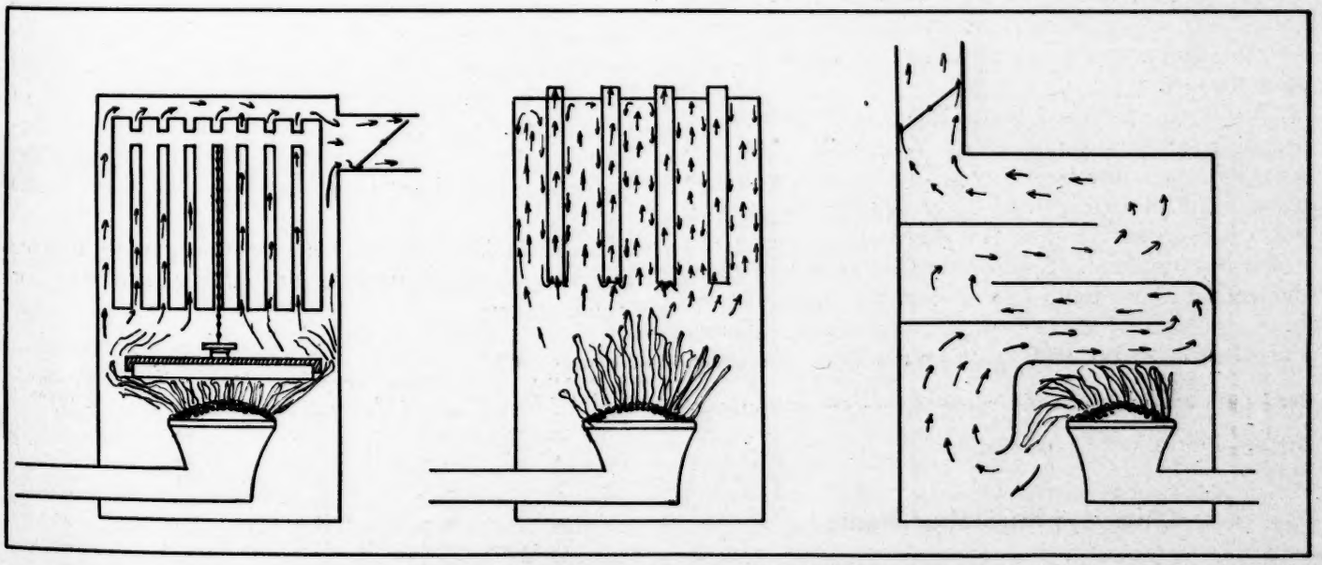
Low volatile semi-bituminous coals of the Pocahontas New River Fields and Central Pennsylvania contain 16% to 22% volatile, 68% to 77% fixed carbon, 3% to 10% ash, 2% to 6% moisture, and run from 14,000 to 15,000 B.t.u. per lb. of dry coal. These coals swell when heated and "coke," forming big lumps. These lumps must be broken up by some means during the early stage of combustion and when broken they can be used with good results under a stoker. Their ash fusion point lies in the neighborhood from 2500° to 2800°, thus permitting good rates of combustion.

Stoker Capacity

Experience shows that considerably more heating capacity is required to raise the temperature of a space than to maintain a given temperature after it has been once attained. The surplus needed, as compared with the normal demand, varies greatly but may be taken, in the average case, at not less than three times to four times that required for constant needs. It is desirable in many cases to have the stoker of such a capacity that it should not have to run more than 6 hr. to 8 hr. on the average winter day to maintain the required temperature. If the stoker has not this capacity it will be found, as a rule, unsatisfactory for it will not in a reasonably short period bring up the temperature from a "dead cold," as for instance after an all night shutdown, to a comfortable day temperature. On the other hand, a stoker need not be so large as to be capable of heating up a cold place in so little time that it may mean an excessive outlay of capital for a machine entirely too big for the plant. Some stoker people have not taken into consideration the last mentioned facts and, as a result of this, have advised machines of far greater capacity than is economically wise. Excessive stoker capacity, like other excess investments, may mean losses rather than gains.

An average heating season may be taken as having about 5000 heating hours, and a stoker of the "all or none" type of feed will have to work not 5000 hr. but considerably less, say 2000 hr. If the stoker has a variable discharge capacity, and it is used to throttle down its discharge, it may be called upon to operate almost all the 5000 hr. In the East, available figures show that the maximum heating hours are about those given with a minimum of about 900 hr. and a fair mean of about 1300 hr. A small stoker using about 8 to 9 tons a season will have a capacity of 20 lb. feed per hr. This means 900 hr. running per season. A house of say 20 apartments may use 100 tons of coal per season and will have a stoker whose capacity will be 100 lb. feed per hour; this will run 1800 hr. per season.

During the heating season there are relatively few extremely cold days when the coal consumption will have to be at a maximum. Here again experience shows



Three methods of baffling boilers when installing stokers

that on these "coldest days" about 1% of the season's fuel requirements will be consumed. In other words, if the total seasonal coal requirement is 20 tons, then the coldest day will require $20 \times 2000 \times 0.01 = 400$ lb. If we assume that this consumption takes place in a space of 8 hr., the feed rate of the stoker will be $400/8 = 50$ lb. per hr. If we select a stoker of this rating, or capacity, it will suffice for the plant in question.

As a result of these experiences and observations various rules have been suggested in connection with the problem of estimating stoker capacity for heating requirements. Such rules are found in the catalogs of a number of makers.

Another method of estimating is to base the size of a stoker on the size of the boiler to which it will be attached. If the boiler has been ample to supply the heat before, it will surely be sufficient to supply the heat when it is stoker fired. A simple rule is:

Stoker capacity = Grate area boiler (sq. ft.) × 6 × K
where K = 1.2 to 1.5;

the smaller values of K applying to larger stokers and the larger values applying to smaller stokers. Simplified, the rule is that the stoker capacity can be found by multiplying the boiler's grate area in square feet by 7.2 to 9, depending on the size of the boiler; the smaller value applying to large size boilers, and the larger to small boilers, while intermediate size boilers will have an intermediate value—say 8.

Boiler Horsepower

For some purposes it is desirable to know the stoker capacity in terms of boiler horsepower; this rating while becoming obsolete is still demanded for certain stoker applications.

If we assume 11,000 B.t.u. coal and an efficiency of say 60%, a boiler horsepower will be produced by the combustion of 5 lb. of coal. This figure, 5 lb. of coal, is usually used in approximate calculation of stoker horsepower, although it is quite arbitrary as it depends on the efficiency, the heating value of the coal, and other factors.

This figure combined with the usual allowances of 240 B.t.u. and 160 B.t.u. per sq. ft. of radiator surface for steam and hot water, respectively, and with the usual figure of 10 sq. ft. of boiler heating surface per boiler horsepower produce two other figures which are useful in estimating. A simple computation will show that on the above basis 1 lb. of coal will supply 28 sq. ft. of steam radiator or 45 sq. ft. of hot water radiator. For a boiler rated at 3000 sq. ft. on this basis the stoker feed on a steam job would come to $\frac{3000}{28}$ or approximately 100 lb. per hr. of coal.

Chimneys for Stoker Plants

The size of chimney will depend on the capacity of the stoker. Sizes suggested by Clarence V. Beck are tabulated herewith.

Capacity of Stoker in Lb. Feed Coal per Hr.	Chimney	
	Diameter In.	Height Ft.
20	10	30
40	10	40
60	12	40
90	15	50
100	15	50

The writer would be inclined to take larger values such as those now in use in hand-fired practice, since they are on the safer side. In any event it must not be imagined that because stokers have forced draft the size of a chimney is of secondary importance. If the chimney cannot eliminate the gas produced, the stoker cannot be expected to work properly.

Installation Dimensions

If a stoker is to perform well it must be properly installed in the boiler. And the boiler itself must have sufficient furnace volume. Furnace and firebox volume, as found from experience, can be simply stated as follows:

Allow 1 cu. ft. of furnace volume for each 3 lb. of coal burned per hour, when possible; 1 cu. ft. per 4 lb. of coal burned per hour as a limit.

The height of the combustion chamber must be such that the flame does not impinge directly on the boiler surface. To provide for this flame clearance, or headroom, as it is sometimes called, we may have to pit the stoker to an extent necessary to obtain the furnace volume in accordance with the rule laid down in the last paragraph. In some cases pitting is also necessary to provide clearance for ashes.

Some boilers are so designed that they will not absorb sufficient of the heat produced by the stoker because of allowing the hot gases from the products of combustion to escape too soon. In boilers of this kind it may be advisable to resort to one of three available means to increase their efficiency when installing a stoker. The first consists of baffling (Fig. 1). Here we avoid the impinging of the flames direct on the boiler itself and by this artifice we increase the time which the gases remain in the boiler as well as reduce fly ash escaping. We may also resort to the use of downdrafting (Fig. 2), or finally, the artifice of curtaining (Fig. 3) the boiler. All these means have the same ultimate object of holding the heat longer in the boiler.

In the table herewith we give a resume of furnace volumes, head clearances, and stoker capacities for small stokers.

Feed Rate Lb. per Hr.	Furnace Volume in Cu. Ft.		Distance from Boiler to Stoker Retort in In.	Desirable Clearance in In.
	Max.	Min.		
20	6.6	5.0	24	28
30	10.0	7.5	24	30
40	13.3	10.0	24	30
50	17.0	12.5	25	30
60	20.0	15.0	26	32
75	25.0	18.7	28	32
90	30.0	22.5	28	34
100	33.3	25.0	30	36

EDITORIALS

The Real Property Inventory

TABULATION of the results of the Real Property Inventory has been stopped. The substantially completed records are bundled up, the staff laid off, and the organization broken up. This means that the valuable figures will probably go into permanent cold storage in Washington and will never be available in a form useful to the public or to the building industry. If this policy continues, and it will unless enough influence can be mustered to stop it, the whole project might nearly as well never have been started so far as this industry is concerned. Its entire cost originally estimated at $1,500,000 can be charged against "make-work" last winter and spring.

What makes this situation especially exasperating is that only a trifling amount of clerical work and publication of the final tables is all that remains to be done to finish the project in full. The entire cost for completion should not be much more than an additional 1% of the amount already expended. What, we may ask, is the sense of spending over $1,000,000 to collect data and then balk at an additional $15,000 to $25,000 in order to make the collected material useful? This is the kind of decision and management which, if persisted in, will do much to discredit the present Administration. It has all the aspects of being another of those projects which in their original form contained much of promise but which are bogging down through sheer failure to carry through.

We are firmly of the opinion that everyone interested in real estate or in building ought to get behind an organized drive to see to it that these figures gathered at so much expense are made fully useful to the public which has already invested so much in them.

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Banks and Federal Housing Loans

ABOUT the first thing the FHA did was to start working with banks and other financial organizations to persuade them to sign up under the 20% insurance feature of the act. As soon as they signed they were eligible to make use of the government insurance to guarantee losses up to 20% of the amounts which they loaned to modernizing jobs of the kind permitted. As a result of this effort some 7000 of these organizations have signed the agreement.

Signing did not mean that they all intended to start making loans at once or that they proposed to go out actively after this kind of work. Some did both, others were lukewarm, while still others have never done anything more than sign the agreement. Probably many of them never will unless they are helped out of this lethargy. Latest figures show that over 1000 of the 7000 who signed up have actually made some loans, and that those 1000 are well enough scattered over the country so that loans can be had from at least one bank in most communities.

There has been some misinformation about the status of the banks who signed and also considerable criticism by manufacturers, contractors, dealers, and others who have found that particular banks are either not cooperating at all or else have signed the agreement but done nothing more. While this grumbling is understandable in a way, it certainly is not going to help things or persuade any bank to go into making modernizing loans. Neither is there any need for concluding that the whole modernizing plan is going to the dogs because every single bank in the country isn't wholeheartedly behind it.

Keep in mind that the purpose of the whole FHA plan is to furnish a set-up to help the building industry work *itself* out of its slump. The plan never contemplated such an ideal arrangement that all any member of this industry had to do is to walk into a bank with a handful of paper and come out with all loans neatly arranged. Possibly the time may come when that will be the situation, but not now. At this stage work is necessary. All the government plan does is to place the bank in a position to come under the insurance fund when and if it actually does start making loans. If persuasion or something else is necessary to get the banks actually started, that something must be supplied by us. That is a portion of our job under the plan. The thing to do, therefore, is to find out exactly *why* the particular bank is not doing anything, and proceed accordingly. The real reason usually is that the bank officers are afraid of these loans. In many cases there is no doubt that their fear comes from failure to understand the plan in detail, failure to appreciate its possible profits to the bank, and the feeling that their own particular customers are not interested. Our part is to help to dissipate such thoughts and get action. This cannot be done without a full understanding of the plan on your own part. The Administration has put out printed material covering many of the points. Other information is available. Study it and be prepared. Then when the opportunity comes you can add your weight to the pressure which is being steadily exerted by so many in the building industry and even outside it.

If past experience with similar lending plans is any criterion, the banks will some day, and that shortly, be glad to take an active part, for there is profit for them in these loans when properly managed, even at the low rates allowed. Until that stage is reached, keep exerting your pressure whenever and wherever the opportunity comes. One of the important phases of the installment plan for modernizing is to get more and more banks active all the time. Your particular part may seem small, but keep pressing.

Abstracts . . .

Reviews and Summaries of. . . . Current Papers, Books and Pamphlets

Domestic Hot Water Supply

A book on the problems encountered in domestic hot water supply has recently appeared in England. It is treated from the viewpoint of the layman who has no special interest in the subject except as a user. The author states that the reason for the need of such a book lies in the fact that there are thousands of houses with unsatisfactory hot water supply, and although the owner knows that something is wrong, no one is able to point out the fault.

After discussing the different methods of heating hot water and the troubles encountered, the book shows how the use of an ejectulator will remedy most of the faults. The ejectulator is a hot water tank fitting, patented in England, which heats only a portion of the hot water in the tank unless more is required.

It should be noted that all the systems described in this book have an elevated, open supply tank.

[*"Hot Water Supply in the Home," by A. R. Watson, published by E. & F. N. Spon, Ltd., London; obtainable from Engineers Book Shop, 227 Park Ave., New York; cardboard cover; 5 in. × 7 in.; 63 pages; price, $1.25*].

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Steam Heating in England

Although the English have been somewhat backward in utilizing steam heat for warming buildings, there is a demand for knowledge of this type of heating, as shown by the necessity for publishing a second edition of this book. The author notes that there has been a considerable growth in the use of steam heating in England.

While the subject is treated in an elementary manner, excellent descriptions of the basic types of systems are given and the book is to be recommended for those unfamiliar with this method of heating. It would be useful also in comparing the degree of development of steam heating in England with that in America.

[*"Steam Heating," by F. W. Dye; published by E. & F. N. Spon, Ltd., London; obtainable from Engineers Book Shop, 227 Park Ave., New York; cloth-bound; 5 in. × 7 in.; 203 pages; price $3.50*].

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Investigation of Warm-Air Furnaces

The ninth publication of the series of investigations on warm-air furnaces and heating systems has recently been announced. Although the report deals chiefly with forced air heating systems operating under different arrangements of automatic controls, there are also discussions of the effect of different forms of furnace bonnets and baffling; of the effect of change in the location, with respect to floor and ceiling, of warm-air registers; of the results obtained by the use of different types of air washers; and of heat emission from various surfaces.

Nine systems of automatic control were tested. All but one of the systems provided for intermittent fan operation. Most of the tests were made with anthracite coal. A few, however, were run with a high volatile bituminous coal. Since the systems' operating characteristics with solid fuels are different in many respects from those obtained with liquid or gaseous fuels, the results of this report cannot be applied to the latter fuels without modification.

The control system with the fan operating continuously was extremely simple, there being only one control. This was a room thermostat which operated the damper motor. It was found that this method of control resulted in high bonnet efficiency, minimum air stratification, and low heat losses from the ducts. The greatest disadvantage was the high cost of fan operation due to continuous running. There was also a slight over-run in the room air temperature after each furnace damper opening, but this was not serious when the room thermostat was sensitive.

One of the most satisfactory systems, having a fan operating intermittingly, used a bonnet thermostat to control the damper operation and a room thermostat to operate the fan. The damper control circuit was so arranged that it closed the damper when the room thermostat was satisfied even though the bonnet instrument was still calling for heat. A second low limit point was provided on the bonnet thermostat to prevent blowing cold air through the register. A stack limit control closed the furnace damper to prevent over-runs in the temperature.

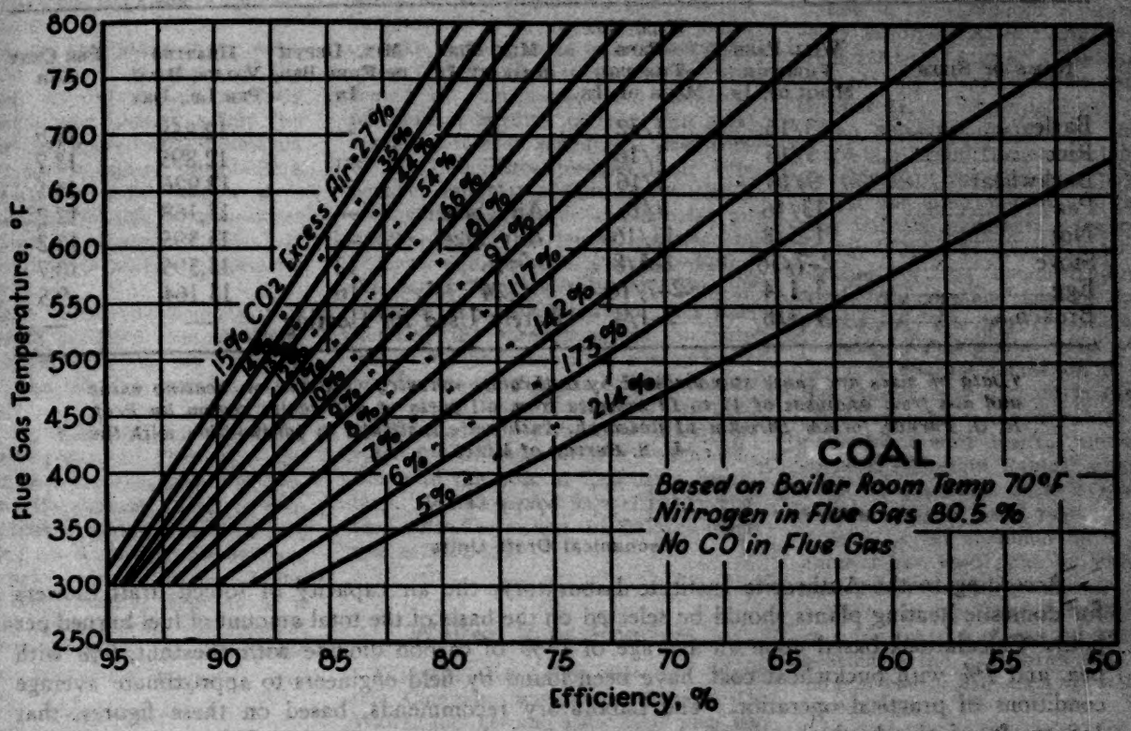
This system provided good temperature regulation throughout the house. It was easily adjusted to a setting that handled a wide range of heating requirements. It also maintained a uniform and positive combustion control. Although one setting of the bonnet thermostat will give fairly satisfactory operation, for perfect operation two settings had to be maintained, one for mild weather and one for extremely severe weather.

The results of the tests to determine the best location of warm-air registers showed that baseboard registers with louvers at the face set downward at an angle of 15° from the horizontal effectively eliminated air stratification in the room and permitted the use of air velocities at the register face as high as 500 f.p.m. The tests also showed that high sidewall registers with the common type of grilles caused excessive stratification of the air unless the air velocity is above 500 f.p.m.

[*"Investigation of Warm-Air Furnaces and Heating Systems, Part VI," by A. P. Kratz and S. Konzo. Bulletin No. 266, Engineering Experiment Station, University of Illinois, Urbana, Ill. Paper-bound; 6 in. × 9 in.; 128 pages; price $1.*]

COMBUSTION DATA—COAL

(These Reference Data (37-A and 38-A) Supersede Sheets 37 and 38 in order to bring the table on sizes up-to-date and to substitute average heating values for the less reliable values pertaining to specific veins.)



Explanation of Boiler Efficiency Chart

The boiler efficiency chart shown above gives the approximate efficiency for a coal furnace when the percentage of carbon dioxide and the flue gas temperature are known. For example, assume the temperature of the flue gas to be 500° with a carbon dioxide content of 8%. Follow a horizontal line from the 500° point on the vertical scale to the 8% carbon dioxide line. Then drop a vertical line to the efficiency scale. The figure obtained, 79.5%, takes into account the heat loss due to excess air and flue gas temperature. It does not allow for losses due to moisture in the coal or air, carbon monoxide in flue gas, radiation, or carbon in ash.

Losses due to moisture are generally small, less than 1%, and can be neglected. Those caused by incomplete combustion with corresponding CO in the flue gas, are of much greater importance and vary with the per cent of CO_2 in the flue gas. For instance, when there is 15% CO_2 in the flue gas, each per cent of carbon monoxide will cause a heat loss of approximately 4%. With 10% CO_2, each per cent of CO results in a heat loss of 6%, and for 5% each per cent of CO causes a loss of 11%.

There are no methods by which the radiation losses may be easily computed. They may range from 3% to 20%. The heat lost in the ash is directly proportional to the amount of unburned carbon in the ash.

Published by Heating and Ventilating, 148 *Lafayette St., New York.* *Copyright, 1934, by* The Industrial Press.

COMBUSTION DATA—COAL

Sizes and Heat Value of Anthracite Coals

Name of Sizes	Will Pass Through Mesh of, In.	Will Not Pass Through Mesh of, In.	Min. Size of Grate, In.	Min. Depth of Fuel Bed, In.	Heating Value, B.t.u. Per Lb., Dry	Per Cent Ash
Barley	3/16	3/32	—	—	12,858	13.9
Rice	5/16	3/16	—	—	12,895	13.7
Buckwheat	9/16	5/16	—	—	12,926	13.5
Pea	13/16	9/16	Any Size	—	13,168	12.2
Nut	1–5/8	13/16	Any Size	—	13,395	12.2
Stove	2–7/16	1–5/8	16	12	13,395	10.7
Egg	3–1/4	2–7/16	24	16	13,164	9.5
Broken	4–3/8	3–1/4	Rarely Used for Heating		—	—

(Data on sizes are those standardized by anthracite industry. Figures on heating value and ash from analyses of 17 to 19 samples from all parts of anthracite region by Prof. H. G. Turner, former Director of Research, Anthracite Institute, in conjunction with the U. S. Bureau of Mines.)

Mechanical Draft Units

According to the Anthracite Institute Laboratory, the air capacity of forced draft blowers for domestic heating plants should be selected on the basis of the total amount of fuel burned per hour. Calculations based upon an average of 13% of carbon dioxide with chestnut, 9% with pea, and 7% with buckwheat coal, have been found by field engineers to approximate average conditions of practical operation. The Laboratory recommends, based on these figures, that 158 cu. ft. of air should be supplied per pound of chestnut anthracite; 228 cu. ft. per lb. of pea coal, and 294 cu. ft. per lb. of buckwheat, as the basis of selecting the blower.

Hand-Firing Methods for Anthracite Coals

1. Whenever new fuel is added, shake the grates gently until the first red coals appear. This will enable air to reach the fire and prevent the formation of clinkers. The fire should never be poked as this will tend to bring the ashes to the surface of the fire where they will be fused into clinkers.

2. Ashes should never be allowed to accumulate in the ash pit as they will prevent the air from reaching the fire and may cause the grates to burn out. See that the ashes are removed at least once daily.

3. Maintain a deep bed of fuel in the furnace at all times. This will give the most economical results. In extremely cold weather heap the coal in the center of the fire in the form of a cone. The fire burning around the outside of the coal will consume the volatile gases and deliver the maximum heat to the boiler surface.

NEWS OF THE MONTH

Oil Dealers Fight State Code

RIDGEFIELD PARK, N. J.—The Star Fuel Oil Company is preparing to carry the first protest against the New Jersey State Fuel Oil Code Authority to the courts.

Acting under provisions of the code, T. Hueston Solley, member of the State Code Administration, recently brought the Star Company before the police court for a preliminary hearing on the company's failure to submit a monthly gallonage sales report, as is required under the code. Assessments to each company to support the Code Administration are based on these reports.

At a later date, the hearing was transferred to the First District Criminal Court, Hackensack, the basis being that the charge was a misdemeanor.

Joseph F. Kearney, of Palisades Park, attorney for the Fuel Oil Company, said that the company will proceed in the Hackensack Court to contest the charge, making of it a test case of the Code Authority. He believes that the price-fixing features of the code are objectionable, that it is a feature not embodied in the Federal Code, and further, that the assessment features are also objectionable.

Delco Distributor Forms Subsidiary

NEW YORK—Due to expansion of the activities of the General Appliance Corporation in developing new dealer operations, the sales and engineering divisions of the corporation have been separated.

A new subsidiary, Consolidated Engineering Company, has been formed to handle engineering, installation, and service for dealers who prefer to handle only sales. George Olson, superintendent of installation for General Appliance, is manager of the new subsidiary.

Bluth New Secretary of Committee of Ten

CHICAGO—At a meeting of the Committee of Ten, Coal and Heating Industries, September 12, it was decided to hold the annual meeting of the Committee in November, to which will be invited all persons interested in the Committee's activities and in the marketing and utilization of solid fuels.

A meeting committee was appointed consisting of T. A. Marsh, R. A. Miller, and H. R. Linn, to work out details of the program.

T. A. Marsh, president of the Midwest Stoker Association, reported that at the annual meeting of the American Society of Mechanical Engineers in New York in December, a session on the domestic heating problem had been arranged and papers on gas and oil burners are to be presented. A paper on coke burning in an improvised magazine feed furnace is also to be presented at this session but domestic mechanical burning of coal with stokers has not been scheduled. Members of the Committee pledged their support in requesting that the A.S.M.E. reconsider the matter and appoint an unbiased but experienced engineer to prepare and present a paper taking the entire domestic solid fuel heating problem into consideration, and particularly the burning of coal mechanically so that favorable comparisons may be made with gas and oil.

A resolution unanimously adopted by the Council of the Committee provided for the appointment of Marc G. Bluth to the post of Executive Secretary. He has served as assistant secretary since 1931 when the Chicago office was established.

Walter Joins Peerless

WARREN, OHIO—The Peerless Electric Company announces that A. D. Walter has become associated with its organization as factory manager and will maintain his headquarters here.

Mr. Walter helped organize The Ohio Electric & Manufacturing Company in Cleveland, and for more than 15 years has specialized in the design and construction of small motors, including application of special split-phase and capacitor type motors for oil burners and air conditioning systems.

A. D. Walter, new factory manager for Peerless Electric

$99.50 for Conversion Burner in Pittsburgh

PITTSBURGH—The cash installed price of conversion burners being installed in the campaign being conducted by Equitable Sales Company ranges from $99.50 to $109.50. The campaign started July 16 and will be concluded October 31.

The principal feature of the campaign is a "Trial Demonstration" offer. On this plan the customer pays $2 a month for nine months of the first year with no payments being required in June, July, or August. At the expiration of the demonstration trial period the customer has the option of purchasing the burner in 24 equal monthly installments with standard carrying charges added or, of course, the balance may be paid in cash.

In order to take advantage of the potential tenant market there is an optional "Straight Rental" plan. This calls for payments of $2 a month for nine months of each year the burner is used by the customer until the full amount has been paid, at which time title passes to the purchaser.

There is no special house-heating rate for the use of gas for residential heating in the Pittsburgh district. The rate in use is a block type with steps as follows:

First 15 M cu. ft. per month—63c.
Next 85 M cu. ft. per month—48c.
Over 100 M cu. ft. per month—45c
(Discount for prompt payment, 3c per M cu. ft.)

Furnace Code May be Amended

WASHINGTON—The Warm Air Register Manufacturing Industry through its Code Authority has submitted an application for modification of its NRA Code. The modification proposed is as follows:

"That Article II, Section 1 be amended by inserting after the words 'Furnace Gratings' the words, 'Register Bodies' and that Appendix A be amended by adding a section reading:

"*Register Body:* A Register Body is the frame that attaches to the bottom or body of a register face, in which frame are suspended pivotal mobile louvers which are opened and closed with an operative device either vertical wheel, slide, glide, or other movement, or other manual opening and closing device, which register body when attached to the face constitutes a complete register. This register body as described may be either of steel, cast iron or other metal."

Detroit Steam Rates Up

DETROIT—Users of district steam in Detroit will pay more for their service this season than last. Detroit Edison Company has withdrawn the special 10% discount from gross bills that was in effect last year. Removal of the special concession was brought about by the increase in the cost of coal and the overhead of the central heating organization. The usual discounts for prompt payment of bills remain in force.

Rinearson Heads Shaw-Perkins

PITTSBURGH—H. W. Rinearson was recently elected president of the Shaw-Perkins Manufacturing Company. Mr. Rinearson was formerly vice-president of the A. M. Byers Company.

Petro Optimistic

BOSTON—"Generally all signs point to September and October being by far the largest months in the history of the Petroleum Heat and Power Company's 32 years of activity in business," declared Wesley E. Downing, general sales manager, in an address at the company's recent fall sales breakfast at the Hotel Kenmore.

"Prices have been temporarily reduced," he said. "The newspaper campaign is the largest that has been offered. Seasonal conditions are ideal. The new Federal Housing Act opens a greater field than ever before."

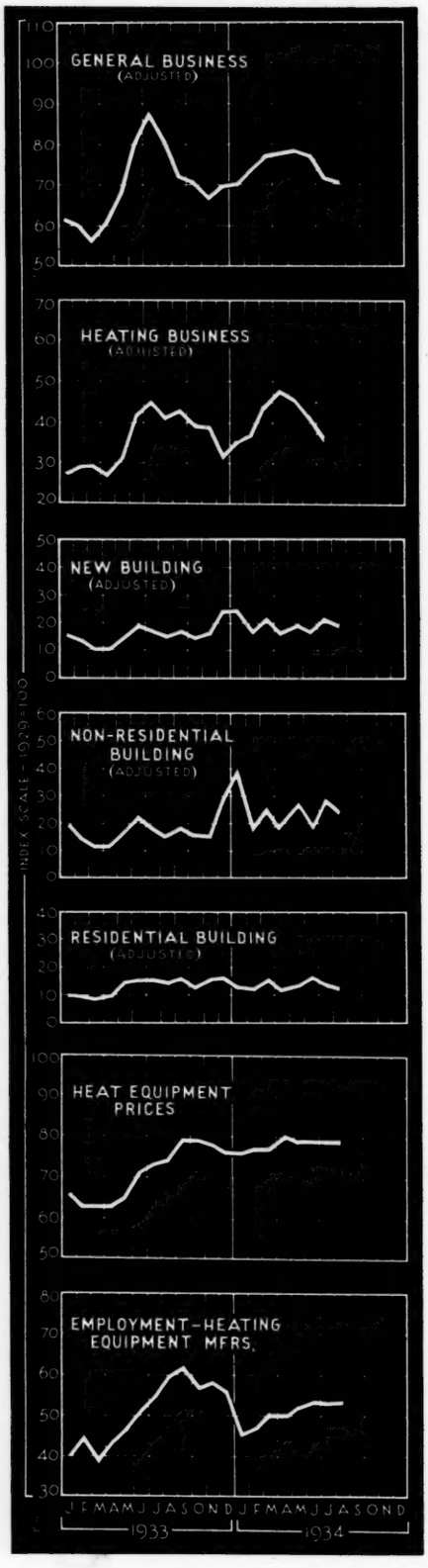
Glen Arnold, vice-president, expressed pleasure at the results obtained so far this year. Raymond Babcock, eastern sales manager, outlined the company's fall advertising and sales promotional program. T. K. Parkman, assistant general sales manager in Boston; Frank Johnson, assistant to the vice-president; John Gill, manager of the Providence plant, and Leo Miller, his assistant, also spoke.

Control Company Starts Drive

MINNEAPOLIS—According to Minneapolis-Honeywell Regulator Company, there is a large market in the sale of controls and accessories to modernize heating plants. This company proposes to get at this market through the offer of a free inspection which will give salesmen an opportunity to make constructive suggestions, many of which will result in orders. Individual dealers who have carried on such campaigns are reported to have produced a considerable extra revenue.

To assist in the development of this business the company has prepared and is now running a national advertising campaign in five national magazines and 15 newspapers in the larger centers.

Business Trends


GENERAL BUSINESS (ADJUSTED)
HEATING BUSINESS (ADJUSTED)
NEW BUILDING (ADJUSTED)
NON-RESIDENTIAL BUILDING (ADJUSTED)
RESIDENTIAL BUILDING (ADJUSTED)
HEAT EQUIPMENT PRICES
EMPLOYMENT—HEATING EQUIPMENT MFRS.
INDEX SCALE—1926=100
J F M A M J J A S O N D J F M A M J J A S O N D
1933
1934

Above charts marked "adjusted" are those in which corrections have been made for seasonal variation. The second chart is that of HEATING AND VENTILATING'S Index of Heating Business Activity. New building figures are from F. W. Dodge Corp. The general business index is based on the "New York Times" weekly index. Indexes of employment and prices are based on data of the Bureau of Labor Statistics, U. S. Dept. of Labor.

Air Conditioning Units Valued at $4 Million

NEW YORK—According to the Unit Air Conditioning Manufacturers Association, preliminary figures indicate that the annual gross sales for last year of unit type equipment was approximately $4 million, and that the current year will see this volume exceeded by 50% or more.

The membership of the association, formation of which was announced in HEATING AND VENTILATING last month, is believed to represent from 80% to 90% of current production.

San Diego Pushes Gas Heating

SAN DIEGO—The Gas Appliance Association of San Diego in cooperation with San Diego Consolidated Gas and Electric Company is conducting a campaign for the sale of central gas heating appliances and floor furnaces during August, September, and October. On furnaces the gas company is paying a bonus of $12 for a 40,000 B.t u. input furnace, plus 30 cents per 1000 B.t.u. additional capacity.

Bosworth with Toridheet

CLEVELAND—M. F. Bosworth, formerly with J. Walter Thompson Company and Corday & Gross Company, has been appointed advertising and sales promotion manager of Cleveland Steel Products Corporation, Toridheet Division.

Cast-Iron Boiler and Radiator Shipments Up

WASHINGTON—Shipments of cast-iron round boilers and cast-iron radiators reported for the month of August, 1934, were both nearly double those reported during July. This represents a sharp increase even though the seasonal trend is normally upward. In other words, shipments of both of these products took a most encouraging upturn during August. So true was this that in each case the actual quantities involved were greater than those reported in any August since 1931. As these two products are so widely used, this sharp increase in shipments can be taken as a most encouraging sign.

Although oil burner sales during July were slow, in August they regained their usual strong, seasonal position with a total of 10,344 burners for the month sold in the United States. Of these, 1159 were boiler-burner units.

Develop New O. B. Unit

GREENWICH, CONN.—He-Li-Po, Inc., is a new corporation formed here by Ogden Minton to develop and market an oil-burning unit designed to furnish both heat and electric current for homes and commercial buildings. The trade-name "He-Li-Po," an abbreviation of "heat, light, and power," has been given to the unit. The corporation has opened offices in the Smith Building, Greenwich Avenue.

An experimental unit now in operation is said to consist of a 26-hp. oil-burning engine directly connected to a compound wound generator which supplies current for lighting, cooking, and other purposes. The water jacket of the engine is connected to the return lines of the heating system. Water which is heated in the jacket is sent back through the system either as hot water or steam. The engine as built uses No. 2 oil.

A. S. H. V. E. Staff Member Survives Ship Disaster

NEW YORK—Pauline Kurland, of the A.S.H.V.E. headquarters' staff, was one of the fortunate survivors of the *Morro Castle* disaster. According to Miss Kurland the smoke and heat became so unbearable that although she is an inexperienced swimmer, jumping overboard seemed preferable to remaining on the ship. A young Cuban, who was washed alongside of her and hung to her lifebelt, was an added handicap. After being in the water six hours a Coast Guard boat picked her up, but due to the rough seas she was forced to remain on the boat for three hours.

She was given first aid at Spring Lake, N. J., quickly recovered and a week later returned to her duties at headquarters, where she is the office heroine.

New Newark Dealers

NEWARK, N. J.—Meyer Rutkin heads the newly organized Rutkin Co., 60 Park Place, formed for the distribution, installation, and development of oil burners and accessory equipment.

The Blocker Air Conditioning Corporation has been incorporated to deal in air conditioning equipment. It is authorized to issue 750 shares of no par value stock. Allen F. Pierce is the registered agent.

James V. B. Post & Company, heating equipment dealer, has started business in the Lefcourt Building. James V. B. Post is president.

Carrier Engineering Corporation has appointed the Blocker Air Conditioning Corporation as distributor for its smaller air conditioning systems in certain territories of northern New Jersey.

The company will be at 825 Frelinghuysen Avenue and will be directed by H. T. Blocker, formerly northern New Jersey branch manager for Carrier. The sales and engineering staff of the company will consist of former members of the Carrier branch office including E. J. Delahanty, A. Lind, J. W. Obreiter, R. S. Reynolds, W. E. Staat, May Stacey, and H. A. Sturges.

Queens Utility Cuts Gas Rates

NEW YORK—The Queens Borough Gas and Electric Company, serving the Rockaways and several adjacent Nassau County communities, announced September 26 a reduction in rates for gas for house-heating and lower rates for all-year water heating.

The new rates for house heating, effective September 24, represent the fourth reduction in the cost of gas for house heating purposes during the last four years. The new schedule is applicable to consumers using gas exclusively for house-heating.

The new rates are as follows:

First 500 cu. ft. per month, $1 per month; next 2,000 cu. ft. per month, 11 cents per 100 cu. ft.; next 4,000 cu. ft. per month, 9 cents per 100 cu. ft.; in excess of 6,500 cu. ft., 5½ cents per 100 cu. ft.

Weber Handles Chrysler in St. Louis

ST. LOUIS—The Weber Implement & Automobile Company has been appointed distributor in this area for Temperature Corporation, national distributor of Chrysler air conditioning equipment.

The Weber Company, which was organized in 1902, has been identified with both the growth of the farm implement and later the automobile business. In the case of the latter, they started in selling automobiles as early as 1908. At the present time this company is the distributor for Plymouth and De Soto cars.

George Weber is president of the company and Albert Weber is vice-president. Edward R. Koenig is secretary and treasurer. General offices are located at the corner of Locust Street at Nineteenth.

New Mohawk Valley Firm Begun

HERKIMER, N. Y.—The Airite Corporation of Herkimer has been chartered to deal in heating, cooling, and air conditioning appliances. The capital stock consists of 250 shares at $100 each and 500 shares common no par value. Directors are Angus M. Waterbury, of Whitesboro; David H. Ames Jr., and Henry G. Hatfield, of Utica.

Hoffman Appoints St. Louis Representative

ST. LOUIS—J. S. Malone, 7124 Waterman Avenue, has been appointed sales representative for the Hoffman Specialty Company to cover this territory.

Code Authority Approved for Air Valve Industry

WASHINGTON—NRA on August 28 officially recognized the following as members of the Code Authority for the air valve industry:

A. E. Bastedo, Burnham Boiler Corp., Irvington, N. Y.; G. E. Cage, American Radiator Co., New York; J. L. Dole, The Dole Valve Co., Chicago; R. H. Hubbard, The Beaton & Cadwell Mfg. Co., New Britain, Conn.; A. H. Magee, New York Air Valve Corp., New York; C. H. Olmsted, Jas. P. Marsh Corp., Chicago; H. W. Reis, W. A. Russell & Co, New York, and W. K. Simpson, Hoffman Specialty Co., Inc., Waterbury, Conn.

Coal Price Up

BOSTON—Price of steam bituminous to commercial buyers in Boston has been advanced 25 cents a ton, most contracts being effected with this price provision. Mine run, in four ton lots, sells for $7.75, and stoker coal, $7.40.

BOSTON—Seeking higher freight rates, which would add an estimated $5,000,000 to New England's fuel bill, leading railroads have asked the Interstate Commerce Commission to authorize a new schedule of higher freight tariffs. The proposed rates on coal would add in many cases 30 cents a ton to existing charges and would increase the cost of transporting coke by rail.

Local retail solid fuel dealers protest the proposal of the railroads and it is expected that some concerted action towards fighting the increase will develop soon.

Dayton Engineers Organize

DAYTON—Engineers and architects here have organized under the name of the Affiliated Architects and Engineers of Dayton, according to an announcement made recently by Lawrence Hall, president.

Other officers of the group are Charles A. Hock, vice-president; Nelson Bell, treasurer, and William G. Ward, secretary. These men, together with C. E. Banta, Howard Germann, and E. A. Hart, make up the executive board.

The new organization will seek to better conditions in the engineering and architectural professions, and to promote carefully designed and well-constructed building and engineering projects.

Boston A.C. Bureau Opens Season

BOSTON—At the first fall meeting of the Air Conditioning Bureau, held September 12, 35 members attended the dinner in the air conditioned grill room of the Hotel Bradford. Guests were present from New York and Philadelphia. Feature of the evening was a paper by I. C. Baker, York Ice Machine Company, read by L. S. Davis, Boston manager of the company in the absence of Mr. Baker, before 50 members.

Harvey and Wrenn to Address Gas Men

SAN FRANCISCO—J. W. Wrenn, Pacific Gas & Electric Company, will speak on "Where Does Gas Stand in Air Conditioning," at the 41st annual convention of the Pacific Coast Gas Association at Del Monte, October 9-12.

L. C. Harvey, Bryant Heater Company, will speak on "The Gas Industry's Next Opportunity," while Victor Starzenski will discuss "Why a Major House-Heating Campaign" at the 16th annual convention of the American Gas Association, Atlantic City, October 29-November 1.

S. H. B. I. Elects Tull

CLEVELAND—At a meeting of the Steel Heating Boiler Institute, September 12, Charles N. Tull, president of Spencer Heater Company, was elected president of the institute. John R. Collette, vice-president, Pacific Steel Boiler Corporation, and Frank D. Metcalf, president, International Boiler Works, were elected vice-presidents. R. A. Locke continues as secretary and treasurer.

Welding Clinic Planned

NEW ORLEANS—Completion of plans for the holding of a four-day welding clinic here starting October 24 has been announced by The Linde Air Products Company. This will be the fourth large clinic of this type sponsored by this company this year, others having been held at Birmingham, Houston, and Cleveland.

The purpose of the clinic is to pass on to those interested in oxy-acetylene welding and cutting information on new developments in the industry; to assist those who have welding and cutting problems; to demonstrate and give instruction on new and old applications of the oxy-acetylene process; to afford a chance for discussion and interchange of ideas among those attending.

The New Orleans Clinic will be held at the Isaac Delgado Central Trades School.

A billboard advertisement of United Associates

Homebuilder's Billboards Feature A. C.

NEW YORK—"Streamlined windowsills" and similar features evidently carry a less potent appeal nowadays than health and air conditioning. At least the billboard advertising of United Associates, Brooklyn and other Long Island points, home developers, feature "air conditioning," with other better-health promoters as their prime inducement.

Examination of one of the houses showed that the plant is made up of an oil-fired, warm-air furnace, fan, sectional filters, overhead warm-air registers in rooms, with cold-air registers in floors. Summer operation consists of keeping the furnace fan going. Humidification is by an automatically fed surface humidifier in the furnace bonnet.

On a corner of the roof there is an open porch where one can bask in the sun on balmy days, while just within is a small sunroom equipped with special glass said to transmit ultra violet rays.

The builders maintain that the air conditioning appeal is one of the most forceful that has been used in finding purchasers for the five of these houses already sold.

A. C. Firms at Electrical Show

NEW YORK—Heating and air conditioning apparatus occupied an important position in the second annual National Electrical and Radio Exposition held in Madison Square Garden September 19-29. Although attendance was slightly below 1933 figures, it was estimated that the business written was in excess of $1.5 millions.

A complete line of air conditioning was exhibited ranging from small spot coolers to central systems of 20-ton capacity. Some of the manufacturers showing heating and air conditioning equipment were Frigidaire, General Electric, Kelvinator, Norge, Delco, American Radiator, Westinghouse, Timken, Century, Petro, and Quiet May.

Kelvinator Conditions Oklahoma Cafeteria

OKLAHOMA CITY—Temperature control in the Britling Cafeteria here appeared to constitute an unsurmountable problem, owing to the presence of a large centrally-located well that extended from the first to the third floor. Careful planning of the installation solved the difficulty.

Six suspended-type and two floor-type Kelvinator air conditioners are equipped with specially selected Uniflow grilles, and so located and adjusted that the influence of the 16 ft. × 30 ft. well is negligible. Two 20-hp. condensing units serve the conditioners. Condensing water spray towers, using no city water except that necessary to compensate for evaporation losses, are connected to the condensing units, located in the basement.

Sarco Opens Newark Branch

NEWARK—Sarco, Inc., heating equipment maker with headquarters in New York, has opened a branch office at 1025 Broad Street.

A. C. Costs 83 Cents per Ton

CHICAGO—The recently conditioned Tribune Tower and newspaper plant operated 1,358 hr. during June, July, and August, producing 16,295 tons of refrigeration at a cost of 83 cents per ton. Coal used in generating steam for the thermal compressors cost $4100 and the water $9400.

New Firms in Hartford

HARTFORD — Johnson - Lindahl Company, Inc., has been organized here to take over the business of Lindahl, Inc., 99 Franklin Avenue, sheet metal manufacturing and erection. John O. Johnson, of the Johnson Sheet Metal & Roofing Co., Norwich, Conn., is president of the new corporation, and Oscar Lindahl is treasurer. The company will build and install heating and ventilating air distribution systems.

Liner-Atwill Co., 4 Olive Street, which for the past 15 years has specialized in sheet metal manufacturing and installation of construction and architectural sheet metal, has announced its entrance into the air conditioning field. George R. Couch, an experienced heating engineer, is in charge of the air conditioning division.

Homestead Insulation Company has been formed here, with offices at 51 Homestead Avenue to carry on a complete insulation business. Authorized capital of the corporation is $50,000, with $2,000 paid in. Officers are Maude S. Foster, president and treasurer, and Alice C. Reardon, secretary.

Mass. Engineers Inspect College Plant

SOUTH HADLEY, MASS.—The Engineering Society of Western Massachusetts held its September meeting at Mt. Holyoke College to enable its members to inspect the college's new oil heating plant which combines several novel features in central heating.

After the inspection trip dinner was served in the Nonotuck Hotel in Holyoke. Speakers included C. W. Colby, engineer of Fred T. Ley & Company, in charge of the heat installation; D. W. McLenegan of G. E., and Karl W. Rohlin of Warren Webster Company.

A. C. for Grocery

BOSTON—Among one of the first grocery and meat markets in Boston to be air conditioned is Blair's Foodland, 2214 Washington Street. The Engineering Company has installed a year-'round Lord-Kendall air conditioning system. Cooling is done by well water and the system provides for complete deodorization.

Worthington Acquires Carbondale

HARRISON, N. J.—The Worthington Pump and Machinery Corporation has acquired control of the Carbondale Machine Co., Carbondale, Pa., manufacturer of air conditioning and general refrigeration equipment.

York Hotel Gets Immediate Benefits from A. C.

YORK, PA.—When the early summer of 1934 indicated that records for heat and humidity would be broken, the Yorktowne Hotel here turned to air conditioning to increase its ratio of satisfied customers.

While the air conditioning division of York Ice Machinery Corporation was planning a central plant type system for the new Lounge, the hotel management decided similarly to equip the Coffee Shop at the same time.

The ceiling of the Lounge is overlaid with gold leaf. To mar this ceiling was out of the question, so the supply grilles were located in the floor.

The four directional grilles in the Lounge are placed around the three sides of a U-shaped booth in the center of the room. The velocity and angle of the air stream is such that persons in the booth are not aware of the air distribution. The return openings are cleverly concealed beneath the upholstered seat along the wall. The air passes through a duct formed by the base of the upholstered seat to a floor opening and into the duct system in the hotel basement.

Since the hotel ballroom is directly above the Coffee Shop, it was impossible to bring the conditioned air through the ceiling, so that here, too, the supply is through the floor. However, there is a great difference in the type of supply grilles, necessitated by the dissimilarity of ceiling construction.

The Coffee Shop has an attractive cross-beam ceiling of relatively low height. For this reason the conventional wall grille air supply would not provide adequate distribution. Likewise, an effective ceiling air supply of the ordinary design would not harmonize with the decorations. Therefore, three hollow steel columns were regularly spaced along the length of the room, connected to the supply duct in the basement, and used to distribute the conditioned air from top grilles at the proper level below the beams. This method provides uniform air distribution regardless of any rearrangement of coffee urns, food cases, or other fixtures.

The air conditioning equipment was put into operation on July 24. A comparison of hotel receipts from July 24 to August 16 with the same period of 1933 shows a 15% increase in the number of coffee shop patrons, with a 9% increase in the amount of the average meal check.

Canadians Watch FHA Plans

TORONTO—Contractors and engineers throughout Canada are much interested in the plan of the United States government's program involving the expenditure of a billion and a half dollars to assist the building trades industry to recover from its state of atrophy. The progress of the FHA campaign is being followed with much interest by the heating trades in Canada as it is felt that such a system should be followed here to stimulate modernization, some little experience in the Dominion proving that the idea is a sound one. It is claimed that in view of the plentitude of money possessed by Canadian financial institutions and available at low interest rates for safe investments, such a campaign, if backed by the government, would go a long way toward reestablishing property values on a sounder basis.

A. C. at Phila. Electric Show

PHILADELPHIA—The Seventh Annual Electric & Radio Show will be held in the Convention Hall, October 8-13. In addition to the latest developments in radio and electrical appliances, air conditioning will be featured this year.

Pipe Welding on Acetylene Program

PITTSBURGH—Preparations are fast assuming final form for the annual meeting of the International Acetylene Association, which will be held at the William Penn Hotel in Pittsburgh November 14-16.

Acceptances to address the convention have already been received from Dr. George T. Baker, president, Carnegie Institute of Technology; Dean E. A. Holbrook, University of Pittsburgh; Prof. J. H. Zimmerman, Massachusetts Institute of Technology; A. R. Ellis, vice-president Pittsburgh Testing Laboratories; Dean R. L. Sackett, Pennsylvania State College, and E. F. Blank, Jones & Laughlin Steel Company.

The technical sessions of the convention will include such subjects as pipe welding and testing.

A. C. Feature of Chicago Meeting

CHICAGO—The fall meeting of the Chicago chapter of the Air Conditioning Engineers was held at the Chicago Lighting Institute, September 12. The guest speaker was Frank D. Chase, president of Frank D. Chase, Inc., engineers and architects, who spoke on "Air Conditioning from the Social and Economic Viewpoint." John Howatt, chief engineer of the Chicago Board of Education, discussed "Air Conditioning from the Engineering Side," in which he stressed the importance of getting the price down within reasonable limits before the engineers can expect to create a popular demand for conditioning.

The lectures were preceded by a symposium on the mechanical aspects of air conditioning by members of the chapter who presented five-minute talks on fans, filters, cooling coils, boilers, furnaces, ductwork, refrigeration, and automatic controls. Future meetings of the chapter will be held on the second Wednesday of each month.

A. S. M. E. to Hold Air Conditioning Meeting

NEW YORK—The Metropolitan Section of the A.S.M.E. will hold an air conditioning meeting Monday, October 22. A paper will be presented by A. M. Norris, Chatard & Norris, Baltimore, on Psychrograph, a Graph for Determining Air Conditioning Loads and Capacity. The meeting will be held in Room 501 of the Engineering Societies Building. Albert H. Morgan will be chairman of the meeting.

The meeting is being held under the auspices of the Process Industries Division.

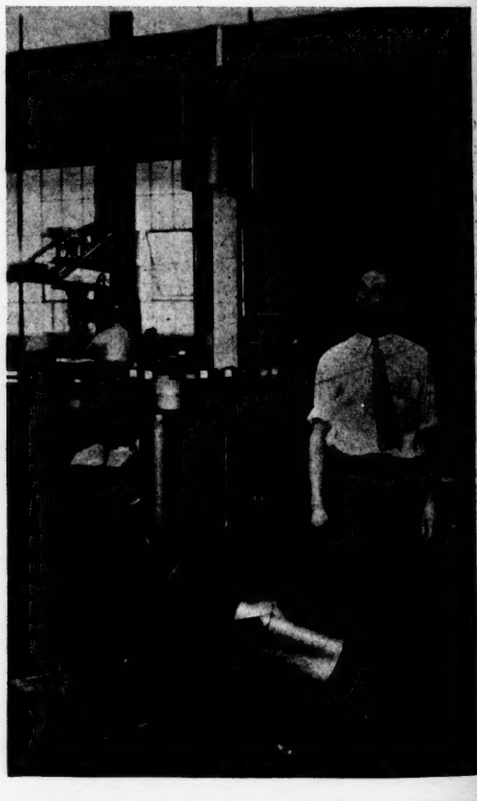
PICTURE PARAGRAPHS

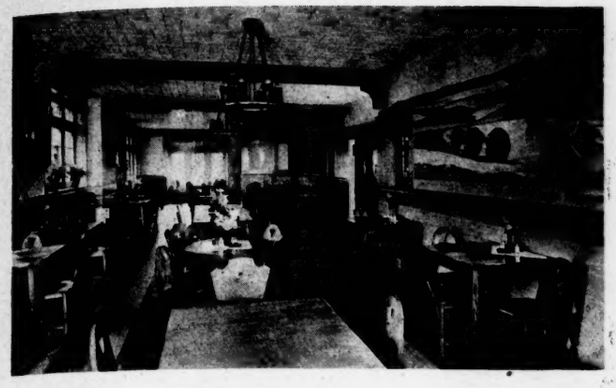
NEW BUREAU OF MINES HEAD, Dr. John Wellington Finch, sworn in as Director of the U. S. Bureau of Mines, August 28. Born 1873, graduated from Colgate University, 1897. Has been state geologist for Colorado and consulting geologist for leading mining organizations. Since 1930 he has been Dean of the University of Idaho's School of Mines. Last July his appointment to the Bureau was held up for political reasons. ↓

↑ 350 AIR CONDITIONING UNITS are being installed in the offices of Potomac Electric Power Co., Washington. Reuben Trane, president of The Trane Company, and Brace Crawford, air conditioning engineer for the utility, testing one of the units.

← AIR CONDITIONED BERTHS in the new high-speed, streamlined sleepers designed for Union Pacific, under construction by Pullman. Air conditioning by Frigidaire.

16 IN. ADJUSTABLE BAILEY ORIFICE installed by the U. S. Navy to test aircraft carburetors. Air supply will be from —60° to 200°, through use of a refrigeration system, heating plant, and throttling device. Altitudes up to 6 miles can be simulated. ↓

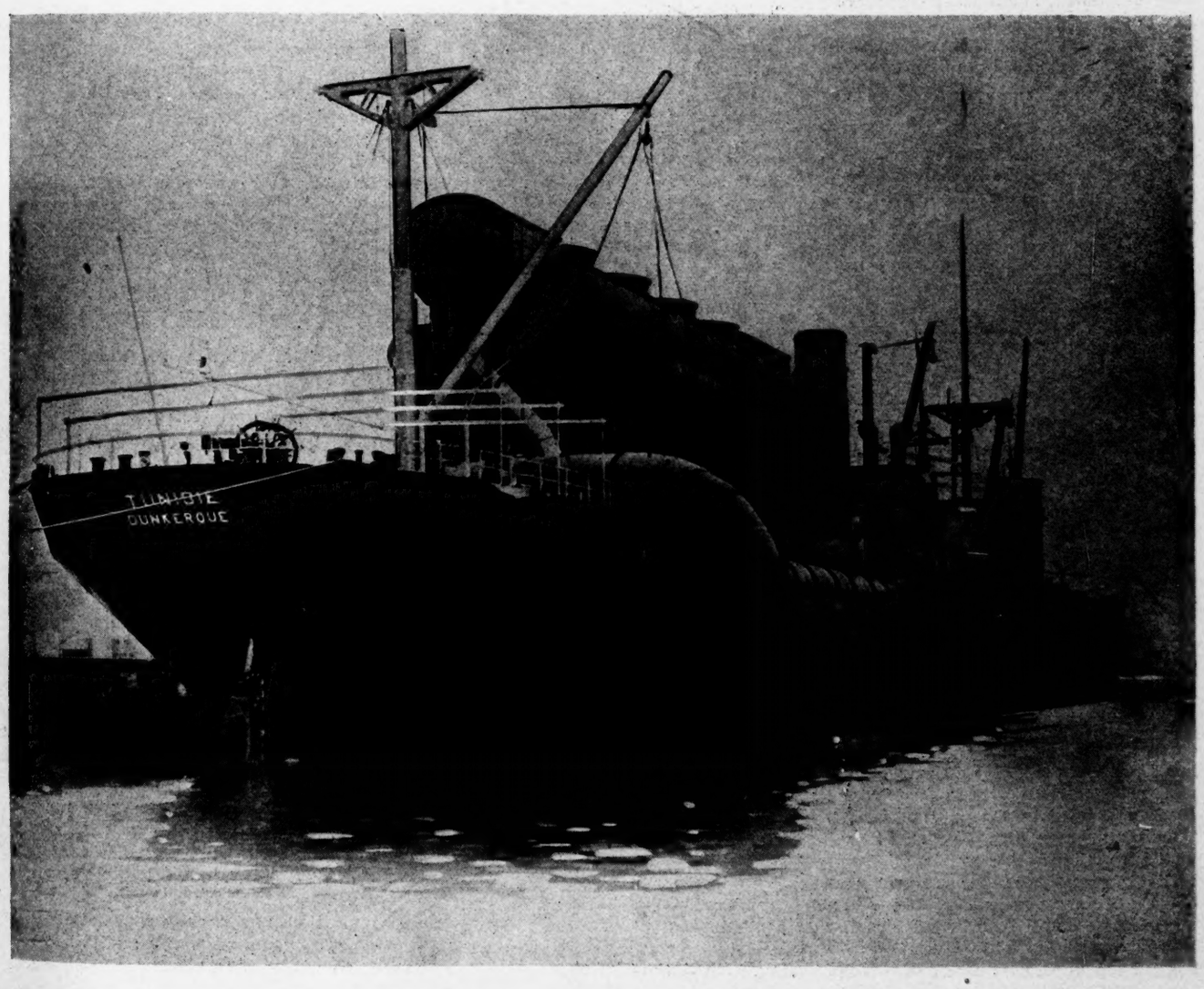




↑ A 10-TON COMPRESSOR is part of the air conditioning system in this Lancaster, Pa., bus terminal restaurant, finished in Pennsylvania Dutch fashion.

↑ VENTILATING WINDOW SHADES by Morse & Driscoll, Inc., have been installed in the Hotel New Yorker. The shade can be lowered from the top for ventilation, a feature which also facilitates cleaning.

ICE FROM OCEAN POWER. The floating ice-making plant *Tunisie*, the idea of Georges Claude, French scientist and neon tube inventor. Warm surface sea water is pumped into a fireless "boiler" where a vacuum is maintained by water at 60° pumped from a depth of over 2000 ft. The surface water boils, generates steam which drives refrigerating machinery. The ice is to be used primarily for air conditioning. Photo Underwood & Underwood. ↓



Electrical Ass'n Hears Talks on A. C.

NEW YORK—Aristocrats of two generations ago were good judges of comfort. The Murray Hill district which so many of them selected for their homes, turns out to be the most comfortable spot in hot weather anywhere in the southern part of Manhattan Island, according to a comfort survey of New York being made for the Electrical Association of New York, Inc., by Dr. E. E. Free of the E. E. Free Laboratories. A preliminary report of this survey was presented by Doctor Free at a meeting held at the Association's Electrical Institute, Grand Central Palace, September 14.

At the same meeting, Elliott Harrington, General Electric Company, discussed the technique of air conditioning and the apparatus available and its proper use. J. W. Mersfelder, Frigidaire executive, discussed the economics of air conditioning and its advantages from the dollars and cents standpoint to the building, store, office, etc.

While all of New York shivers or swelters in more or less the same way depending on weather changes, Doctor Free explained, small local differences have been detected in both temperature and humidity. Along the river banks, for example, humidity tends to be higher than elsewhere, which makes these locations slightly less comfortable than average, in spite of a small lowering of temperature which also exists. In closely built districts, temperatures tend to be slightly higher, also with decrease of comfort.

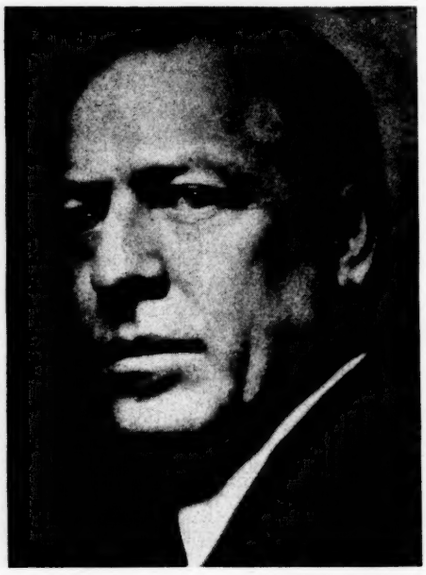
According to Mr. Mersfelder, room cooler sales in New York this season were made to four general groups as follows: residential, 31%; offices, 39%; commercial, 22%; industrial, 8%.

Revere Opens Grand Rapids Office

GRAND RAPIDS, MICH.—Revere Copper and Brass Incorporated announces the opening of an office here at 922-23 Grand Rapids National Bank Building. David T. Applebee is the district manager.

New Plant for Girls' School

NEW LONDON, CONN.—An oil-fired central heating plant of vacuum type has been installed at Williams Memorial Institute, girls' school here, by the Hopson & Chapin Co., 231 State St. The plant furnishes heat and hot water to the newly-completed Buell Hall structure as well as to the two older buildings of the Institute. Automatic zone control is provided for each building, with individual temperature control for classrooms and auditorium.



P. R. Mork, new Crane vice-president in charge of sales

Crane Promotes Mork

CHICAGO—On September 1 Crane Company announced the transfer of P. R. Mork from New York to the general office here where he will serve as vice-president in charge of sales. Mr. Mork, who was vice-president in charge of the New York territory, was manager of the Minneapolis and Duluth branches before going to New York in 1927. In his new position he will assume the duties of vice-president H. W. Seymour, who is on leave of absence due to ill health.

P. R. Berryman, formerly vice-president of the Trenton Potteries, has succeeded Mr. Mork as manager of the New York branch and associate branches of Crane Company in the metropolitan area.

NDHA Executive Committee Meets

CHICAGO—The Executive Committee of the National District Heating Association met at the Stevens Hotel here September 27 to lay out plans for the committee work for the coming year. The meeting was largely attended, with all members of the executive committee and most of the committee chairmen present. As a result, a program expected to be especially useful, was formulated. At the same time it was decided to hold the next convention at Philadelphia in June, 1935.

Chrysler Appoints Walsh

PHILADELPHIA—The Chrysler Motor Car Company has appointed James A. Walsh, Inc., as its distributor for air conditioning units. Mr. Walsh has leased space in the Architects Building, 17th & Sansom Streets.

Live to 90— with Air Conditioning

LURAY, VA.—T. C. Northcott was 90 years old September 7 and he is hale and hearty as can be—all because of a 30-year use of air conditioning.

Back in 1901 he built a system in his home by which he borrows the naturally cool air from the Luray Caverns, which he owns and operates.

Mr. Northcott built his home over his caverns and, with his previous experience as a heating and ventilating engineer, devised his air conditioning system so that the air would be filtered through limestone, which he believes is exceptionally healthful and clean.

With this plant circulating the cave air throughout the house at the rate of 8000 c.f.m. and a complete air change every 4 min., the owner claims that on the hottest day the interior of the house is cool and comfortable at 70°.

Another outstanding feature of this plant is the use of steam coils under each shaft through which the air passes, thus enabling him, by the simple turn of a valve, to have warm or cold air at will.

Contractors Exhibit at Show

SPRINGFIELD, MASS.—Several of the city's leading heating contractors had displays at the annual Eastern States Exposition September 17-24. Burden-Bryant Company had six booths and exhibited R. & B. boilers, NuWay burners, and other equipment.

Swett Bros. Heating & Appliance Company, at its two booths, showed the Iron Fireman stoker and Delco oil burner.

Higson to Handle Oil-O-Matic

DANBURY, CONN.—Alfred H. Higson, head of Higson's Super-Service Station, 133 White Street, has announced appointment of his firm as exclusive distributor in Danbury for the Williams Oil-O-Matic line of power oil burners, air conditioning units, and hot water heaters.

R. M. A. to Hold Meeting

WASHINGTON—The Refrigerating Machinery Association will hold its annual meeting October 22 at the Stevens Hotel, Chicago.

This association is rounding out a year of productive activity in the exchange of technical information, standardization of equipment, and promotion of a high standard of trade practices.

At this meeting the association will elect officers and plan its activities for the coming year.

Heating Leads in FHA Modernizing Loans

WASHINGTON—On September 21, FHA announced the results of an analysis of 718 of the first modernization and repair loans, made in order to determine just what proportion of the money was being used for different types of improvements. The 718 loans totaled $415,719, an average of $579, and were used for 1824 different jobs. In other words, a given loan is usually being used for more than one repair job. Ninety-five per cent of the loans were for home improvements and 5% for work on business property. The following table shows the per cent of the total devoted to different types of improvement:

PURPOSE	PERCENTAGE
Heating	14.53
Inside painting and redecorating	14.47
Plumbing	13.82
Exterior repairs	9.70
Roofing	9.27
Outside painting	9.21
Remodeling—general	8.50
Interior repairs	5.59
Cementing	3.95
Lighting	3.51
Remodeling—bathroom	3.07
Additional rooms	2.41
Remodeling—kitchen	1.97

The terms for which the loans were made were as follows:

TERM OF NOTE	No. OF LOANS	PERCENTAGE
1 year	227	31.62
18 months	59	8.22
2 years	411	57.24
3 years	21	2.92

FHA Equipment Rules Liberalized

WASHINGTON — Originally all equipment eligible under FHA loan requirements had to be definitely built in or non-detachable. For example, automatic stokers came under the plan only if the unit was permanently attached to the boiler. The rule now reads that stokers are eligible if they are permanently installed.

In addition to that equipment which comes under the heading of that which becomes "a part of the real estate when installed," the following equipment is now included as being eligible:

Heating control devices
Non-detachable heating systems and equipment
Domestic water heating equipment
Oil burners, including storage equipment and controls
Automatic stokers and ash removal equipment (if permanently installed)
Radiators (if part of heating system) including valves and accessories
Unit heaters (under similar conditions)
Air conditioning equipment (not including single-unit types unless these are built in)
Humidifying equipment (if built in)
Ventilating equipment (including fans, if built in)
Coal chutes

Certain types of equipment are considered movable and may *not* be included in financeable loans. Such movables include:

Non-built-in electric fans
Non-built-in single-unit air conditioners

Mass. Dept. of Education Offers Courses

BOSTON—Courses in practical combustion, domestic heating with solid fuels, and oil burners are to be given this fall and winter in the University Extension series under the auspices of the Massachusetts Department of Education. In the second semester a course in heating and ventilating will also be offered.

The practical combustion course, directed by John Weske, Harvard Engineering School, consists of eight lectures, with a nominal fee of $5. This course is also offered by correspondence.

The domestic heating course will be conducted by H. L. Brown and C. E. Flanders, heating engineers. This consists of 12 lectures with a fee of $4, and is intended to be of particular interest to those engaged in the sale, distribution, and utilization of coal.

Dewitt M. Taylor, formerly of the mechanical engineering department, Massachusetts Institute of Technology, will conduct the course on oil burners, which consists of eight lectures with a fee of $5. The course is offered for men engaged in the oil burner field.

Detroit P. A. Officers Include Mauer and McRobbie

DETROIT—By a strange coincidence all of the newly-elected officers of the Purchasing Agents Association of Detroit, as well as the retiring president, are connected with the heating and ventilating business, directly or indirectly. F. H. Missig, of the Aluminum Company of America, was installed as president on September 20, succeeding H. C. Shafer, of the Timken-Detroit Axle Company. Other officers who were installed were R. J. Mauer, Detroit Lubricator Company, first vice-president; Joseph McRobbie, American Blower Company, second vice-president, and Henry George, General Motors Corporation, treasurer.

Forms A. C. Company

BOISE, IDAHO—Conditioning Air Corporation of Idaho has been incorporated here to sell and install air conditioning equipment. Elmer Johnson, Edgar F. Lessinger, and E. W. Little are the incorporators.

Tube-Turns' N. Y. Office Moves

NEW YORK—The branch office of Tube-Turns, Inc., has been moved from 30 Church Street to 110 East 42nd Street, the Bowery Savings Bank Building.

W. B. Curley will continue in charge, assisted by I. A. Pfeil.

Modine Appoints Agents

RACINE, WIS.—Modine Manufacturing Company announces the following appointments of sales agents: I. E. Danford, Caldwell, Ohio; Air Conditioning Utilities, Inc., Omaha; A. A. Maycock, Salt Lake City; R. King Rouse, Valdosta, Ga., and Allan Engineering Co., in Dallas, Fort Worth, Houston, San Antonio, and Wichita Falls, Texas.

Drexel Starts A. C. Course

PHILADELPHIA—Drexel Evening Diploma School started September 24 a course in air conditioning and refrigeration for college graduates only. Another course for less advanced students opened September 17. This course will require about three years for high school graduates to complete. For students without the equivalent of high school training it will be necessary for them to take additional preparatory subjects.

Colorado Utilities Starts Gas Heating Campaign

DENVER—Following approval by the city council of proposed rate reductions, the Public Service Company of Colorado early in September launched an intensive campaign to increase the use of natural gas for house-heating purposes. Every medium of publicity and sales effort has been utilized in the drive which will cover Denver and six nearby towns over a period of four to five months.

Rate reductions, aimed specifically at house-heating, are as follows: No reduction on the first 3,000 ft. per month, which provides for cooking and automatic storage water heating for the average family, and will continue to cost $3.75; from 60 cents to 52 cents per 1000 ft. on the next 7000 ft.; from 50 cents to 42 cents per 1000 ft. on all over 10,000 ft. per month. These rates do not apply to commercial usage.

Starting with 8,600 house-heating units in the approximately 57,000 homes in the district, the company expects to gain 1,000 to 2,000 new customers. Results during the first three weeks of the campaign indicate this mark will be reached.

General A. C. Corp. Formed

NEWARK, N. J. — The General Air Conditioning Corporation has been incorporated here to deal in air conditioning systems. The concern is authorized to issue 200 shares of no par value stock. Nathan Tureksy is registered agent.

Harris Heads Detroit Enforcement

DETROIT—The local administrative agency for the heating, piping, and air conditioning contractors' code authority has been formed for this territory and its personnel and plans were given formal approval by the Heating & Piping Contractors Detroit Association at its fall meeting, held September 21. President John B. Coffey, Coffey & Granlund, presided.

Emery E. Harris, Deane-Harris Company, has been selected as chairman of the enforcement agency for the local industry; George S. Clarke, secretary of the Heating & Piping Contractors Detroit Association, has been named secretary, and Charles Galarno, Donald Miller Company, treasurer.

Foster Engineering and Sarco Join Exhibitors Council

NEW YORK—Foster Engineering Co., Newark, N. J., manufacturer of automatic valves for pressure, flow, and temperature control of steam, liquids, and gases, and Sarco Co., New York, manufacturer of steam traps, strainers, temperature regulators, and heating specialties, have become members of the Exhibitors Advisory Council, New York, a fact-finding organization which issues data on industrial and trade shows and expositions.

Kelvinator to Advertise Summer A. C. this Winter

DETROIT—Convinced that its 1935 air conditioning business will be strongly influenced by the efforts put forth between now and next spring toward building increased public acceptance for the product, Kelvinator Corporation will use fall and winter magazine advertising as a foundation for its next year's summer air conditioning sales.

Business magazines will receive most of the space, emphasis being planned to center on commercial air conditioning installations.

The present Kelvinator line of conditioners includes 24 models, available in the floor-type, self-contained and suspended form of unit.

Death Rate Jumped in Hot Spell

WASHINGTON—Air conditioning might have meant the difference between life and death in the Middle West drought area last summer. According to the U. S. Public Health Service, the death rate from all causes during the week ending July 28 in 86 large cities was 12.3 per 1000 population, as compared with 10.2 for the preceding week, 9.9 for the following week, and an expected rate of 10.6 based on the corresponding season of the four years 1930-33. The figure 12.3 represents an excess of 16% above the normal mortality in the same 86 cities during that season of the year.

The figures were studied by S. D. Collins, senior statistician, and Mary Gover, associate statistician, both of the Public Health Service, who pointed out that the increase was largely limited to the Middle West where the drought was severe and the temperatures abnormally high.

Homes Conditioned

HARTFORD — Byrnes - Millward Company has been awarded contracts for installation of air conditioning systems in three private residences in West Hartford. One installation will be of the furnace type, another will be combined with a new vapor heating system, and the third will be a modernizing job.

EHFA Opens Electrical Equipment Display

CHATTANOOGA, TENN.—The Electric Home & Farm Authority opened a display of electrical equipment here September 20. Included in the display is a continuous working demonstration of air conditioning.

Julsrud with Stephens

NEW YORK—Stephens Fuel Co., Inc., 220 East 138th Street, has appointed Rolf S. Julsrud fuel engineer. Mr. Julsrud was previously associated with Combustion Engineering and the Anthracite Institute.

COMING EVENTS

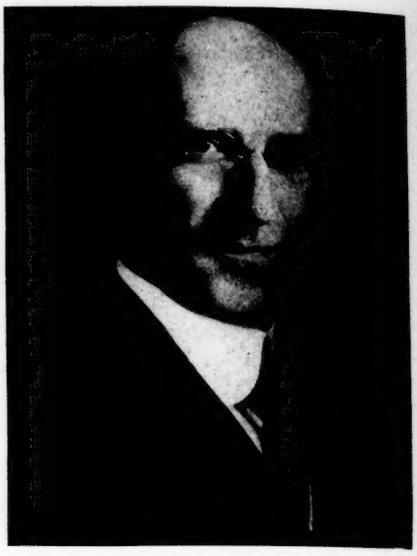
OCTOBER 26-27, 1934. *Fifteenth Annual Meeting of the National Coal Association, Mayflower Hotel, Washington, D. C.*

OCTOBER 29 - NOVEMBER 2, 1934. *Sixteenth Annual Convention and Exposition of the American Gas Association, Atlantic City Auditorium, Atlantic City, N. J.*

NOVEMBER 14-16, 1934. *Meeting of the International Acetylene Association, William Penn Hotel, Pittsburgh.*

DECEMBER 3-7, 1934. *Fifty-fifth Annual Meeting of the American Society of Mechanical Engineers, New York, N. Y.*

DECEMBER 3-8, 1934. *Eleventh National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York.*



Dr. C. W. Rice

Calvin W. Rice

NEW YORK—Dr. Calvin W. Rice, widely known among heating and ventilating engineers, and for the past 28 years secretary of the A.S.M.E., died here October 2 in the Murray Hill Hospital. Taken ill suddenly during the afternoon, Doctor Rice was rushed to the hospital where he died that night from cerebral hemorrhage. He was 65 years old.

Born in Winchester, Mass., Doctor Rice graduated in 1890 from Massachusetts Institute of Technology and received a Doctor's Degree in Engineering in 1926 from the Technological Hochschule, Darmstadt.

Joining the Thomson-Houston Electric Company in 1889 as assistant engineer, he became electrical engineer for General Electric in 1893, leaving to join Anaconda Copper Mining Company and Silver Lake Mines Company, where he was electrical superintendent. He was also associated with Kings County Electric Light & Power Company, Consolidated Telegraph & Electric Subway Company, and N. Y. Edison Company.

Active in many branches of engineering, Doctor Rice specialized in the electrical field, participating in the advancement of home radio receiving sets and, with E. W. Kellogg, invented a hornless loud speaker in 1925.

A member of numerous clubs, societies, and institutions, Doctor Rice is survived by his widow, a son, and a daughter.

Robert P. Handy

EAST HAVEN, CONN.—Robert P. Handy, 54, heating contractor here for a number of years, died at a New Haven hospital following an illness of two weeks. His office was located at 20 Stevens Street.

NEW EQUIPMENT

Thermal Unit V-8 Refrigerating Compressor

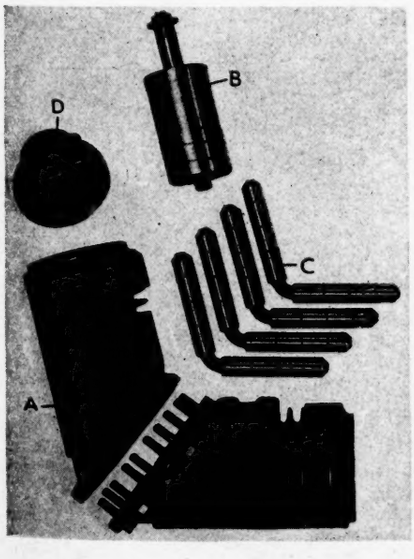
Thermal Units Manufacturing Co., Pershing Road and Loomis St., Chicago, has announced the development of a radically new type refrigerating compressor built in the form of a V. The 8 cylinder compressor has no piston rings, piston pins, crankshafts, connecting rods, gears, cams, or valves.

The compression cylinders are bored in cylindrical blocks of metal B, 4 cylinders being bored in each block. The pistons C are forged in pairs as shown in the illustration and are placed in the compression cylinders in the block B which in turn are placed in the outer cylinders A.

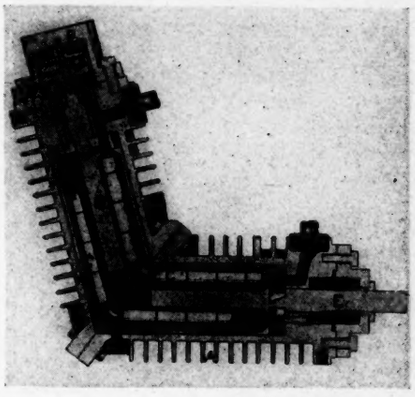
The method of operation is one of the unusual features of the compressor. Power is applied to the shaft E which is direct connected to the compression cylinder block B which revolves in the stationary cylinder A. As B revolves, it carries the pistons C around with it and at the same time the downward moving pistons are forced to move out of the cylinder B leaving a space for the refrigerant. The upward moving pistons are forced back into the cylinder compressing the gas. The operation of the second compression cylinder block, which is at an angle to the first, is the same except that the power for rotation is transmitted through the pistons.

Compression cylinders and pistons rotate immersed in oil. Valves are not used, discharge ports in plates at each end of the cylinders being located in such a manner that, as the blocks rotate, they pass across the intake and the outlet ports at the proper time in each cycle. This allows the pistons to operate within 0.005 in. clearance of the cylinder heads, giving a high volumetric efficiency.

Some of the claims made for this type of compressor are a 45% saving in weight and space, elimination of vibration, and less power required and less wear because of the small number of parts, and also because the pistons travel with a screw-like motion in the cylinder bore.



Parts of Thermal Units compressor



Sectional view of V-8 compressor

Low-Coal Cut-Off for Stokers

The Low-Coal cut-off, a device which stops the operation of any automatic stoker when the hopper gets low in coal, is being manufactured by Knoedler and Meredith, 609 Broad St., Chattanooga, Tenn.

In automatic stokers which continue to operate when the coal gets low, the fire may burn low in the retort so that there is a liability of the worm becoming warped, necessitating a repair bill.

With the cut-off, when the coal gets low in the hopper, the safety switch mercoid tube operates and turns off the stoker and can be made to ring a bell. This operation will save the worm and also prevent the accumulation of smoke in the basement and upper rooms of the house.

The device has a 9-in. square canvas diaphragm, the top of which is bolted to the back of the hopper, 9 in. from the bottom of the hopper, on the inside. The bottom of the diaphragm, level with the bottom of the hopper, is pushed out 1/16 in. by a spring-encased rod which projects through the hopper backward and is attached to the mercoid switch. When coal is in the hopper, this canvas diaphragm is pressed flush against the rear wall of the hopper by the weight against it, but when the coal gets low the diaphragm moves out 1/16 in. and the mercoid switch operates.

Mason-Neilan Ball-Bearing Regulator

A pressure reducing regulator has been developed by the Mason-Neilan Regulator Co., Boston. Known as the No. 505 series, it is equipped with stainless steel ball-bearings. Ball-bearings also turn freely under the spring-adjusting screw and permit pressure settings to be easily accomplished.

Flexible, multiple springs permit the use of larger diaphragms and are said to increase the sensitivity and accuracy of the regulation.

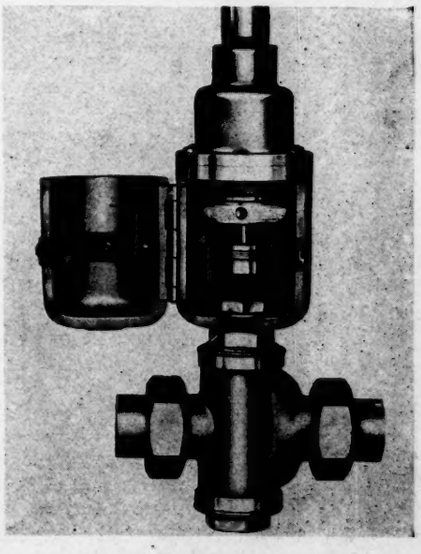
"Freeze-Proof" Refrigeration Temperature Regulating Valves

Fulton Sylphon Co., Knoxville, Tenn., has introduced an improved Sylphon temperature regulator for brine-cooled refrigeration systems, cold storage rooms, refrigerator boxes and drinking water cooling systems.

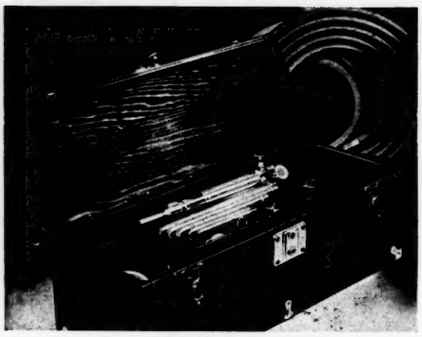
This valve is designed to prevent frost from forming on the valve stem where it enters the stuffing box, a condition which causes many regulators to function sluggishly, or to actually freeze where very low temperatures are maintained.

The construction of the valve provides a metal housing that completely encloses the valve stem and packing nut. This enclosure is filled with asbestos saturated with ammonia compressor oil.

On test, this construction has enabled the valve stem to work freely when subjected to temperatures as low as 70° below zero.



Fulton-Sylphon temperature regulator



Outfit for installing Walseal fittings

Aircobraze Oxyacetylene Outfit

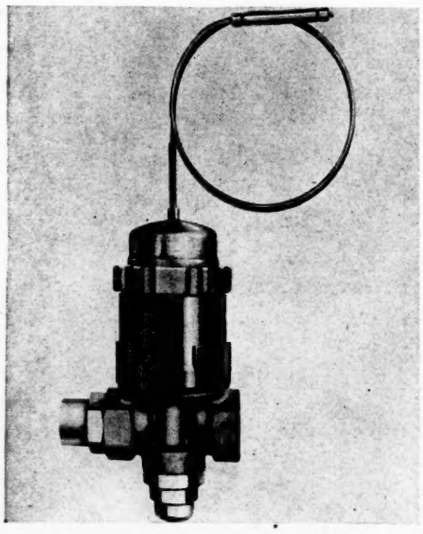
To meet the need of steamfitters and plumbers for a reasonably priced outfit for the installation of Walseal threadless bronze fittings by the Aircobraze process, Air Reduction Sales Co., New York, has developed the Aircobraze oxyacetylene outfit.

With this outfit hooked up to the gas cylinders, it is only necessary to slip the brass pipe into the Walseal fitting until it butts up against the shoulder and apply the process to the pipe and fitting until the white ring of Sil-Fos appears around the pipe.

Thermostatic Expansion Valve

The No. 785 thermostatic expansion valve has been placed on the market by Detroit Lubricator Co., Detroit. The valve was developed for heavy duty work and will take up to 8 tons using freon or sulphur dioxide and 16 tons using methyl chloride.

The valve operates on the same principle as the company's line of 673 and 674 expansion valves, but has been designed with special attention to rugged construction.



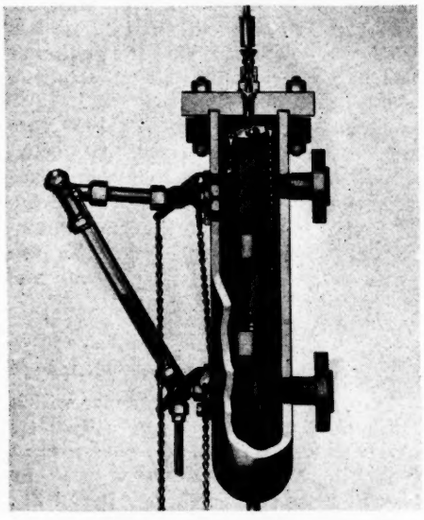
Detroit Lubricator thermostatic expansion valve

Nason Steam Traps

Nason Manufacturing Co., 71 Fulton St., New York, has placed on the market the Titan steam trap, made in four sizes for pressures up to 300 lb., and the Tiny steam trap in two sizes for pressures up to 150 lb. per sq. in. Capacity and compactness are obtained by use of a lever. An open bucket is used as the source of power for opening and closing the valve.

Yarway Water Column

Yarnall-Waring Co., Chestnut Hill, Philadelphia, has made several improvements in its line of Yarway floatless Hi-Lo alarm water column and Sesure inclined water gauge. Balanced solid weights working on the displacement principle operate the whistle alarm at high and low water levels. Improvements include a smaller, lighter, water column body, a more simple and flexible operating mechanism for the alarm, and an inclined connecting member at the top of the gauge which drains back condensate which might otherwise collect at this point.

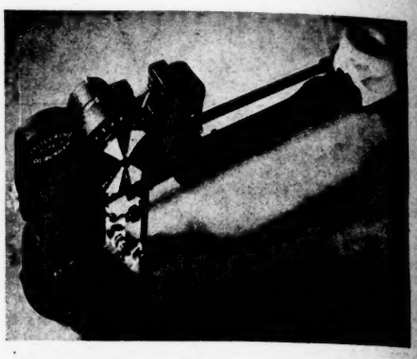


Hi-Lo alarm water column and Sesure water gauge

Sidney Stoker

Stoker Equipment Co., Sidney, Ohio, is selling through dealers and contractors the Sidney domestic stoker for $199.50 installed. The unit is of the underfeed, worm feed type and burns soft coal. It has a heating capacity of 1200 sq. ft. of steam radiator; a neutral and three coal speeds feeding 15, 35, and 50 lb. of coal per hr.; a dustproof hopper holding 400 lb. of coal, and a double protection overload switch and shearing pin.

Four controls are supplied—thermostat, limit, pilot switch, and motor overload cutout.



McIlvaine oil burner which embodies graduated continuous control

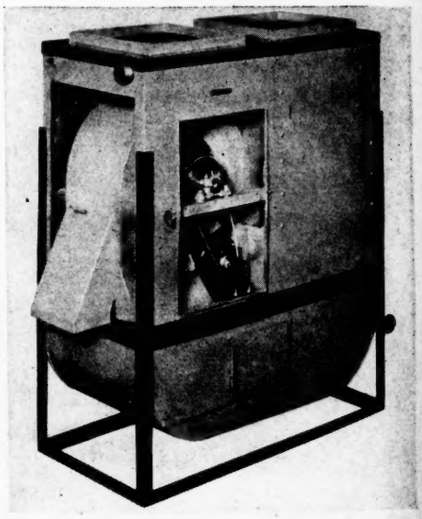
McIlvaine Type V Oil Burner

McIlvaine Burner Corp., 663 West Washington Blvd., Chicago, has announced its Type V burner which embodies the company's principle of graduated continuous control, with the design simplified so that the unit can be sold at a lower price.

The burner operates on No. 2 oil, burning 2½ g.p.h. on high flame and 1/25 g.p.h. on low flame. Oil control is by a spring loaded disc and orifice type valve connected by a link to an air shutter. The oil is vaporized on a hot plate on the bottom of the firepot. A 1/50-hp. motor is used. The capacity of the burner is 600 sq. ft. of steam radiation.

Zephyr Conditioners

Savage Arms Corp., Air Conditioning Div., 100 East 42nd St., New York, has added to its line of air conditioning equipment with the Zephyr Air 85-86-88 series, all-year air conditioners. The units are made for either cabinet or duct installation and with refrigeration capacity of 1¼, 2½, and 5 tons.



Zephyr all-year air conditioner

NOW'S THE TIME *to install* MONEY-SAVING PIPE

Heating contractors can profit by economy in installation—the owner profits by long trouble-free service.

The contractor will save time and money for himself by working with NATIONAL Pipe. Threading, cutting, installing, tightening up, and final inspection are so quickly accomplished with this exceptionally well made, smoothly finished pipe that the immediate gain is very clear.

The property owner's interest will be served because of the extra tight, extra secure, extra durable job that results when NATIONAL Pipe is installed.

Reputation, good will, and a profitable business may be expected to grow up where such materials are combined with sound workmanship. Make NATIONAL Pipe your standby. Produced with unrivaled facilities by the largest manufacturer of wrought pipe in the world. Meets all standard specifications. Recognized everywhere as—

America's Standard Wrought Pipe
For Heating Purposes

NATIONAL TUBE COMPANY · PITTSBURGH, PA.
Subsidiary of United States Steel Corporation

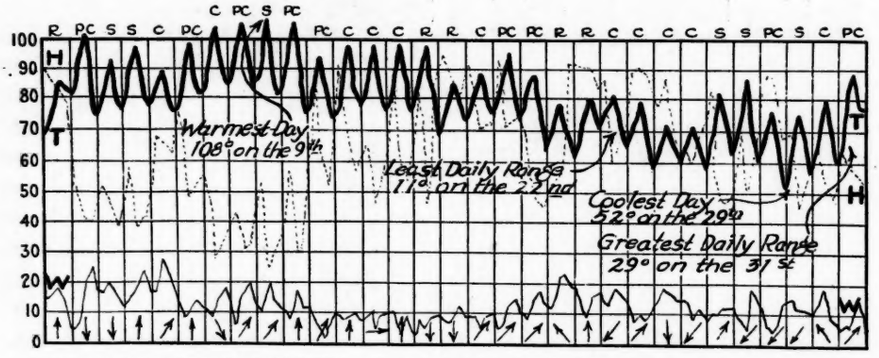
Check these 10 outstanding advantages of NATIONAL PIPE

1. *Completely uniform.*
2. *Strong and ductile.*
3. *Threads easily.*
4. *Flanges readily.*
5. *Coils and bends well.*
6. *Sound joints.*
7. *Available in copper-steel.*
8. *Scale-free.*
9. *Spellerized.*
10. *Rigidly tested and inspected.*

NATIONAL PIPE

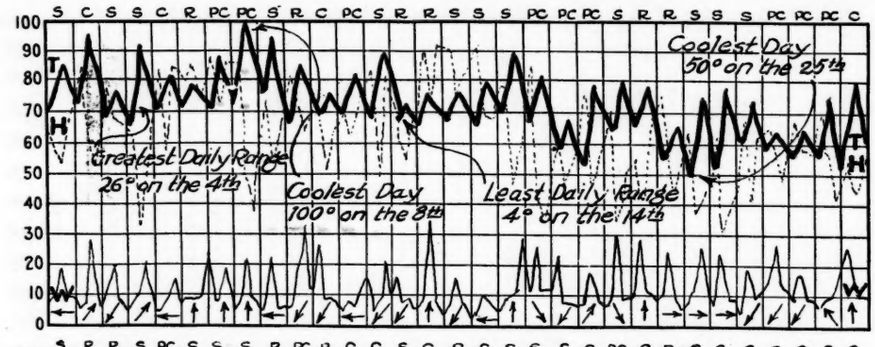
THE WEATHER FOR AUGUST, 1934

Plotted from records especially compiled for HEATING AND VENTILATING by the U. S. Weather Bureau. Heavy curves (T), temperatures in deg. F.; dotted lines (H), per cent relative humidity, from readings at 8 a.m., noon, and 8 p.m., except for New York, which shows hourly readings. Light lines (W), wind velocity in m.p.h. Arrows indicate prevailing wind directions. S—clear; PC—partly cloudy; C—cloudy; R—rain; Sn—snow.



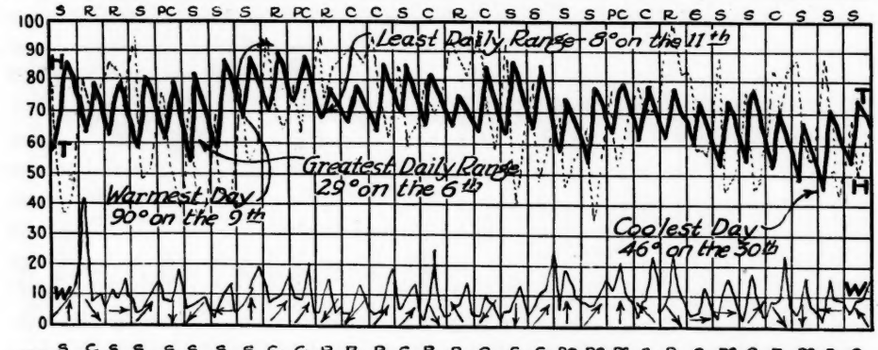
St. Louis

Mean temp. for month, 80.0°; aver. wind velocity, 10.3 m.p.h.; prevailing direction of wind, S.



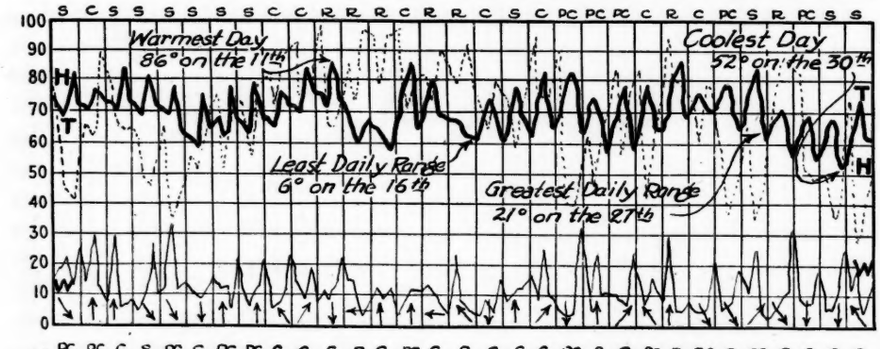
Chicago

Mean temp. for month, 72.4°; aver. wind velocity, 9.0 m.p.h.; prevailing direction of wind, N.E.



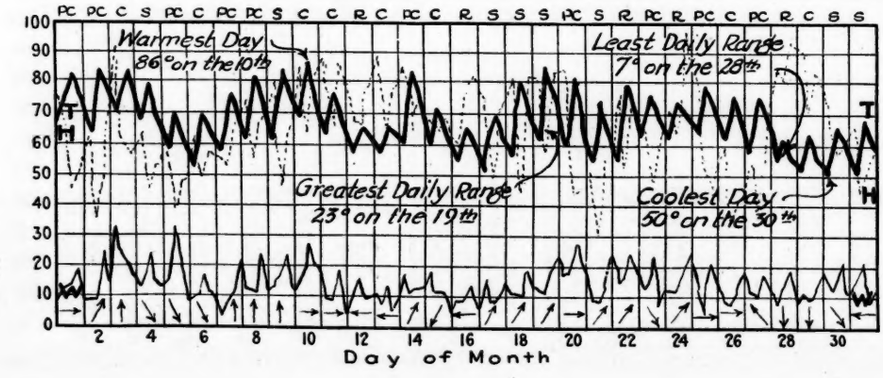
Pittsburgh

Mean temp. for month, 70.7°; aver. wind velocity, 7.9 m.p.h.; prevailing direction of wind, S.W.



New York

Mean temp. for month, 70.4°; aver. wind velocity, 12.2 m.p.h.; prevailing direction of wind, S.



Boston

Mean temp. for month, 67.3°; aver. wind velocity, 12.8 m.p.h.; prevailing direction of wind, S.W.

Leading Testing Society Approves Standardization of Copper Tube

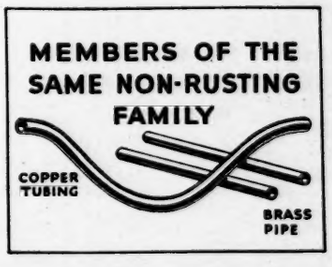
—(So will your customers)

WHAT K.L.M. MEANS

The three standard types are:— *Type K*, for underground services and general plumbing purposes with severe conditions. *Type L*, for general plumbing purposes. *Type M*, for general plumbing purposes with soldered fittings only and for normal water conditions.

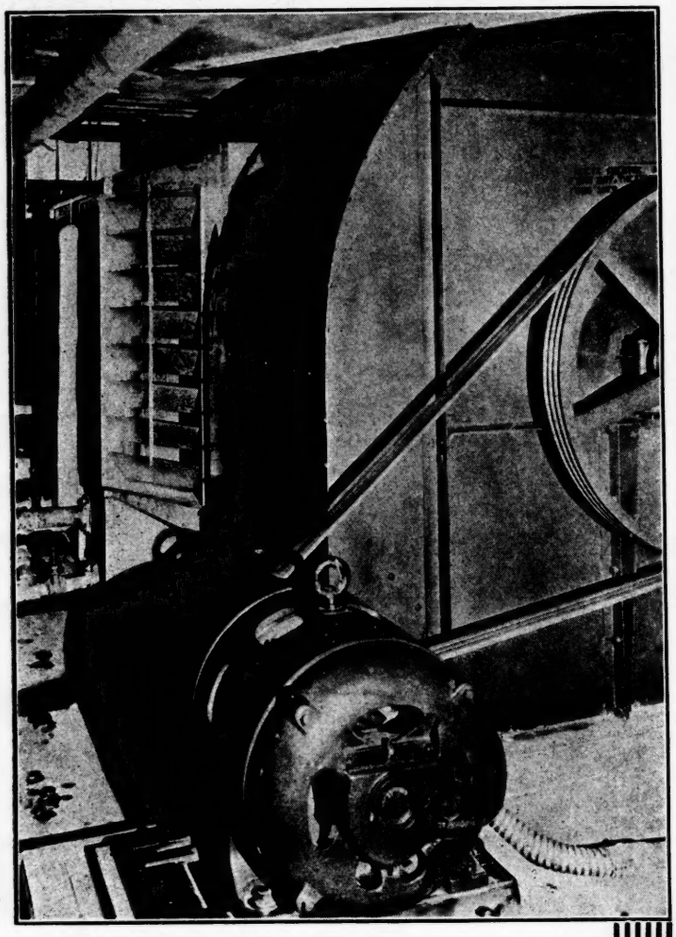
Standardized Copper Water Tube meets the exacting specifications of the American Society for Testing Materials (B88-33). It also meets the specifications of the U. S. Government (WWT 799). And your customers will like it!

For Copper Tube, 99.9% pure copper, can't rust. It is especially suitable for replacement work, but is applicable to many other kinds of work. Its method of handling brings the installed cost down to a point competitive with rustable material. Copper Tube assembled with fittings of the solder or sweat type, require the skill of a competent plumber. When the soldering operations are efficiently performed, the result is a first-class, fine-looking job that will reflect to the plumber's credit and help him sell other plumbing work.



Brass pipe and Copper Water Tube are both members of the same non-rusting family. Brass pipe is the standard to which all plumbing jobs must be compared.

COPPER & BRASS RESEARCH ASSOCIATION · 25 BROADWAY, NEW YORK



AIR CONDITIONING

The variable speed requirements of Air Conditioning Equipment—Blowers, Fans, Ventilators—are so satisfactorily met by Century Multispeed Motors that they are given marked preference by Dealers, Contractors, and Manufacturers who know that the success of their installations depends so largely on continuous motor satisfaction....Consult Century Engineers.

CENTURY ELECTRIC COMPANY
1806 Pine Street St. Louis, Mo.
Offices and Stock Points in Principal Cities

Single Phase .. Polyphase .. Direct Current
1/250 to 600 Horse Power

Century MOTORS

FHA Plans Take Hold Slowly but Steadily

(Continued from page 37)

be very good, especially in such fields as the oil burner and new boilers. Where the contractor depends upon the local banks for the financing the results do not look so promising. The Rhode Island banking laws are so strict and have been so well enforced that there has not been a single bank failure since the beginning of the depression. Though this strictness of the banking laws and the manner of enforcement has proved admirable for the depositors, it places obstacles in the way of banks financing FHA projects as liberally as might be the case were banks permitted to take greater risks.

In the case of heating installations, the increase in cost of both labor and materials is proving an obstacle which is worrying many a contractor. Though he may be able to offer far more liberal financing arrangements than ever before, he has to charge more for the job than would have been the case last year and this fact creates a sales resistance which requires real salesmanship to overcome.

Oil burner dealers are using more newspaper advertising than any other division of the heating business to feature the FHA plan. All oil burner dealers who are featuring the plan report a marked public interest. Those who are depending on the banks for financing do not find that the actual sales closed have increased to any marked degree, while those who are using the manufacturer's plan are reporting a material increase in sales actually closed.

Some of the oil burner dealers report an apparent increase in cash sales. In other words, the drive being made for modernization appears to stimulate those who have the money to pay cash for oil burners which they need.

The general consensus of opinion among heating contractors is that most of the heating business secured will run under $500 per job. Loans already granted under the FHA indicate that this is likely to be the case.

By the middle of October, it is hoped that sufficient progress will be made so that the records of business already closed will show that the FHA has had a very favorable effect upon business. Whether or not the State laws will be amended so that the banks can take a more active part in financing FHA projects remains to be seen.

Washington and Oregon

Seattle—Featuring the FHA plan in key cities of the Pacific Northwest are novel renovation projects that embrace city-wide interest in these centers. Following on the wings of a most successful "Renovize Portland" campaign undertaken by the First National Bank of Portland, Ore., is the current "Renovize Seattle" campaign, linking heating, ventilating, oil burner, and air conditioning interests to those of all other renovizing specialists. Meanwhile a "Renovize Tacoma" campaign

(Concluded on page 68)

INLAND
COPPER ALLOY
STEEL

FIGHTING CORROSION
is a Profitable Fight

HEAVY LOSSES from corrosion are not inevitable. There is a ready, economical way to reduce these losses radically—use Inland Copper-Alloy Steel.

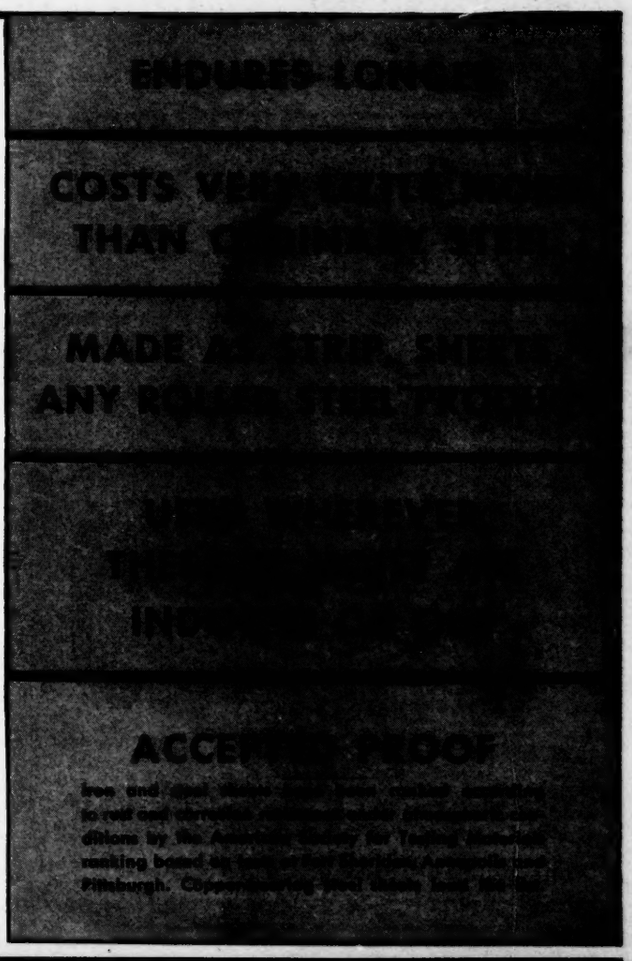
It is an accepted fact that copper-bearing steel endures corrosion longer than any other ordinary grade of iron or steel. Its use is logical on all of the innumerable applications where corrosion is the principal menace to long and profitable use.

For roofs, smokestacks, siding, and the like, fight corrosion with Inland Copper-Alloy Steel—get more value for very little added cost. For products you make for sale offer that universal sales appeal —more value per dollar—by using Inland Copper-Alloy Steel.

Specify Inland Copper-Alloy Steel on your next order. Any Inland Rolled Steel Product can be supplied in this grade of steel.

INLAND STEEL COMPANY
38 So. Dearborn Street, Chicago, Illinois

NRA CODE



INLAND
ABLE SERVANT OF THE CENTRAL WEST
STEEL
Sheets Strip Tin Plate Rails Track Accessories
Plates Structurals Piling Bars Rivets Billets

The Protectomotor Panel Air Filter is a traffic cop. It stops 99-9/10% of the dust, dirt and soot in the air from getting into buildings.

Prevents ruining furnishings, walls, etc. Saves thousands of dollars yearly in the cleaning bills of large buildings. Keeps out billions of disease germs carried by dust.

The Protectomotor has a large filtering surface within a relatively small space. Its efficiency is not affected by continuous service nor by change in volume of air passed.

To clean, simply apply a vacuum cleaner about every two months. All accumulations can be removed in about ½ minute per panel.

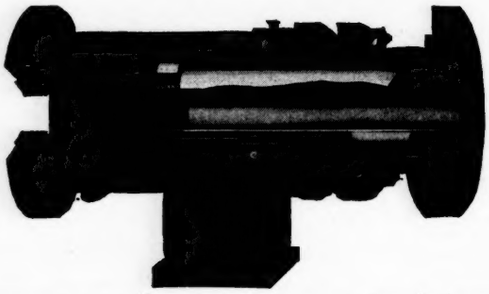
Write for our interesting catalog.

PROTECTOMOTOR AIR FILTERS
REG U S PAT OFF
99 9/10 Per Cent EFFICIENT

STAYNEW FILTER CORP.
15 Leighton Ave.
Rochester, N. Y.

ADSCO

EXPANSION JOINTS are guided INSIDE



Internally guided type illustrated. For all pressures to 400 lbs. and temperatures to 750°F.

The unique internal guide provides full guiding with no contact of polished surface of slip with other metal parts. Largest diameter of joint is smaller than the flanges. Limit stops prevent excess slip travel. Lubricated stuffing box.

• • •

AMERICAN DISTRICT STEAM COMPANY
GENERAL OFFICES AND WORKS
NORTH TONAWANDA, N.Y.
OVER FIFTY YEARS IN BUSINESS

(Concluded from page 66)

is in the making to tie together all specialists and remodeling elements of that city.

In the extensive "Renovize Seattle" movement an old home, one of the oldest in the city, has been selected as a vehicle to show what can be accomplished.

Transported to the heart of the downtown district where thousands view the transformation daily, the house is undergoing a modernizing that offers an example that is being followed by many citizens.

The "Renovize Seattle" campaign, with the old dwelling as a model, was launched by the Seattle Trust Company, a leading financial institution of the city, in much the same manner as the First National Bank of Portland renovized a home in that city. This started a wave of borrowing and building, of renovizing and remodeling, that brought many homes in Portland up to date.

The Seattle Trust Company is reaching every owner of a "dated" home, and is giving real point and purpose to the FHA plan by its own novel additions to the plan. It offers, for example, cash prizes and awards in an interesting competition. Pictures of homes taken before and after renovation or remodeling are entered and individual improvements judged on comparative merits or vast difference of appearance between the shabby old and the bright, efficient new.

As in the case of Portland, the newly created home will be auctioned when completely renovized. The 54-year old shack made into a model home for a family in Portland, brought a handsome price. More important, it attracted 157,000 people, who examined its improvements. The Portland renovization campaign, moreover, was given an award for the most outstanding campaign of a civic nature in the year 1934—so far the first prize of its kind ever given.

With a similar campaign to be started to "Renovize Tacoma" in a short time, the three leading cities of the Pacific Northwest will be in the midst of a most beneficial wave of remodeling innumerable homes and dwellings.

Wisconsin

Milwaukee—The *Milwaukee Journal* is giving homeowners an object lesson of a practical nature by purchasing three homes for demonstration purposes. These structures will be improved step by step, with the newspaper printing frequent news stories and pictures showing exactly how the renovation was accomplished.

The homeowner will be told to consult an architect, how to lay out the work and estimate the cost, how to get financing under the liberal terms of the National Housing Act, and how to get in touch with builders and contractors.

The three demonstration houses, so located that at least one is readily accessible from every part of Milwaukee, will be open for public inspection at all times during the progress of the work.

Renovation cost of the house is being financed by the Building and Loan League. The Milwaukee District of the State Association of Wisconsin Architects has offered the services of members in surveying the houses and drawing up remodeling plans.

NEW CATALOGS

Air Reduction Sales Co., Lincoln Building, New York. A booklet, "Oxyacetylene Welding and Cutting Pressure Regulators and Regulation Problems," of interest to contractors and manufacturers who do welding and require accurate, uniform pressure control and close regulation of oxygen, acetylene, and other gas pressures. Standard size, 16 pages.

Alfol Insulation Co., Inc., Chrysler Building, New York. 3⅛ in. × 6 in., 8-page folder describing the company's aluminum foil insulation. Includes heat loss coefficients for walls, roofs, and floors using this insulation.

Fedders Manufacturing Co., Inc., Buffalo, N. Y. Standard size, profusely and beautifully illustrated catalog featuring the company's Series 3 unit heaters. Specific information on structural details, together with proposed piping diagrams are included. 8 pages.

Groff Safety Relay, Inc., 3817 Ashland Ave., St. Louis. A brochure describing the company's safety relay for electrically ignited, or combination gas and electrically ignited, oil burners, designed for the prevention of burner explosions. The bulletin contains a description of the relay and detailed instructions on installing it.

Hays Manufacturing Co., 12th and Liberty Sts., Erie, Pa. Standard-size, 24-page, loose-leaf, punched bulletin on Hays double seals, the company's fittings for joining copper pipe. Description and method of attaching seals, tests conducted at Columbia University, together with descriptive and engineering data on the full line.

Inland Steel Co., First National Bank Building, Chicago. A folder describing and illustrating uses of Inland Zinc-Alloy steel sheets, made by a process, the result of which is that there is no distinct dividing line between the zinc and the steel. Standard size, 4 pages.

The Modern Coal Burner Co., 20 North Wacker Drive, Chicago. First of a series of new sales promotional literature for dealers. The booklet, which may be used as a proposal, is illustrated with the types of homes and apartments being heated by the Peabody Unitype domestic stoker. Comparison is made by case histories of dwellings previously heated by coal, oil, and gas, with the cost of operation with the stoker.

The booklet contains tabs for insertion of proposal material and heating plant surveys, and is available to dealers interested in domestic stokers.

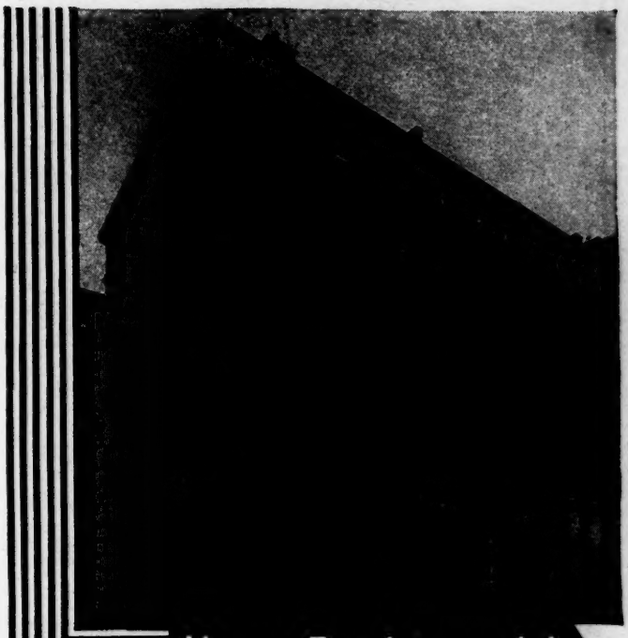
Trenton Auto Radiator Works, Trenton, N. J. A four-page, standard-size folder on Kramer Turbofin unit heaters. Describes features, but consists principally of tabulated engineering data relating to the company's units.

A one sheet insert contains similar information on the company's line of unit coolers.

United States Steel Corporation, Frick Building, Pittsburgh, Pa. A standard-size, eight-page booklet describing a new group of U.S.S. high tensile steels being manufactured in three grades by seven of the subsidiary companies of U. S. Steel Corporation. Chemical and physical properties and a discussion of these properties; shop practice in connection with these steels, and a summary of their advantages are included.

The Williamson Heater Co., Cincinnati, Ohio. Standard-size booklet entitled "Air Conditioning for your Home" prepared for general distribution to prospective retail purchasers of air conditioning equipment. Describes the functions of air conditioning and the company's equipment for accomplishing the condition. 16 pages.

Yarnall-Waring Co., Chestnut Hill, Philadelphia. Catalog WG-1803 covering the improved line of Yarway Hi-Lo alarm water columns and vertical and inclined water level gauges for boilers. Standard size, 16 pages.



How Fashionable Hotel Marguery Saved Over $1500 on Radiator Traps

This exclusive Park Avenue Apartment Hotel, built by the New York Central Railroad, installed Sarco Adapters in their old Radiator Traps. This not only saved money over the cost of buying and installing new traps, but cut in half the cost of installation.

Sarco Adapters

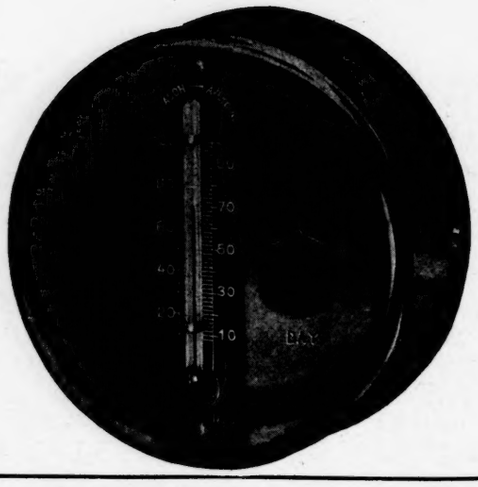
are installed in existing radiator trap bodies and are guaranteed to make old radiator traps of any make equal to new in steam saving. They make radiators heat evenly and rapidly so that ample heat will be furnished with greatly reduced steam pressure.

They consist of a cap and a motor element and can be fitted into any trap without disturbing pipe connections.

Inlet Valves, too, can be modernized with Sarco Packless Valve Bonnets.

Write for full particulars and Catalog P-111.

SARCO CO., Inc.
183 Madison Avenue,
New York, N. Y.
Branches in Principal Cities
SARCO CANADA, LTD.
Federal Bldg., Toronto, Ont., Canada



GREATER ACCURACY

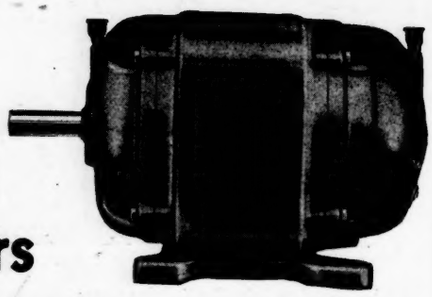
Specialized design promotes in the Gleason-Avery Temperature Regulator a degree of accuracy difficult to duplicate. This, in addition to its unusual sensitivity, reliability and quietness, distinguishes the thermostat as one of the most generally up-to-date and satisfactory units on the market. At a cost so low that it is returned shortly in savings effected, the Gleason-Avery makes positive heat control available in all homes. It is available as a single thermostat or dual, for night-day service. Write for details and dealers' prices.

$24.75
ALL ACCESSORIES INCLUDED

GLEASON-AVERY, INC., 27 Clark St., Auburn, N. Y.

GLEASON-AVERY
ELECTRIC TEMPERATURE REGULATOR

BALDOR

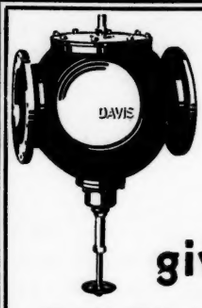


Special Motors

IF you are particular about the motors supplied with your products, standardize on BALDOR Motors. Obtainable in repulsion induction, capacitor, single-phase, polyphase, direct current types — high and medium torque — horizontal, vertical, solid, resilient mountings. Especially applicable to refrigerators, oil burners, stokers, humidifiers, blowers, pumps, unit heaters and similar products. Full information on request.

BALDOR ELECTRIC COMPANY
4353-C. Duncan Avenue, St. Louis, Mo.

MOTORS



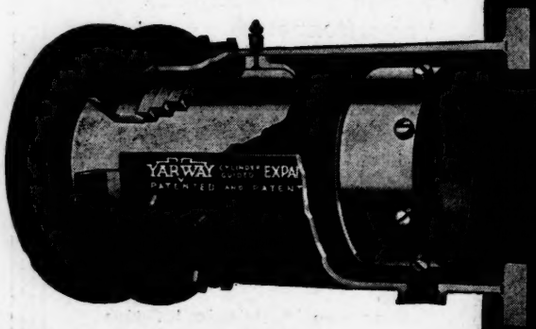
FULL AREA gives added safety

Davis Exhaust Relief Valves — condenser safety valves — hold tight under vacuum and relieve to atmosphere at a fraction of a pound pressure giving full and immediate atmospheric relief. Pressure accumulation that might damage costly equipment is prevented. Davis design provides full pipe area not only through the port but through all body passages as well. This feature has influenced many experienced engineers to specify Davis Exhaust Relief Valves for this important service. They get full condenser protection. Hand and hydraulic lift types. Horizontal, vertical and angle patterns.

DAVIS REGULATOR COMPANY
2553 S. Washtenaw Avenue
CHICAGO :: :: ILLINOIS

DAVIS VALVE SPECIALTIES

CYLINDER-GUIDED FOR TROUBLE-FREE SERVICE



Made in single or double end types with or without base.

YARWAY
EXPANSION JOINTS

Welded Steel construction. Alemite lubrication. Diameter no larger than pipe flange... Outside cylinder guide design prevents abrasive sediment from cutting the sleeve. Write for catalog EJ-1904, which describes both Gland-Pakt and revolutionary Gun-Pakt packed under pressure types.

YARNALL WARING COMPANY, Philadelphia

Wrought Iron
specified for certain Corrosive Services

GRAHAM, ANDERSON, PROBST & WHITE

AMONG the leading architects who have done much to put pipe selection on a sound engineering basis are Graham, Anderson, Probst & White of Chicago. In their offices pipe selection is based on experience backed by service records. Hence in a service where a pipe material has given a long and satisfactory account of itself there it is again used.

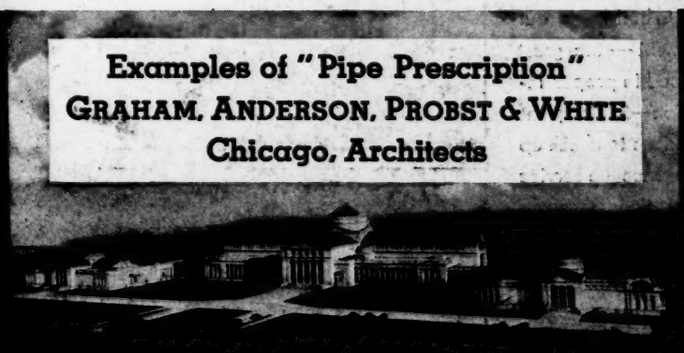
Thus wrought iron is specified for those corrosive services where its records prove it best. Blanket specifications are eliminated and no other material is substituted for the job that wrought iron has done so well for years.

This method of pipe selection, based on experience and service records, which we call "Pipe Prescription," is standard practice in the offices of many leading architects and engineers.

We will be glad to aid in analyzing pipe conditions, in reviewing service records, collected through the friendly cooperation of leading architects and engineers, and in further assisting in "Pipe Prescription."

Ask a Byers Engineer or write our Engineering Service Department.

A. M. Byers Company, Established 1864. Pittsburgh, Boston, New York, Philadelphia, Washington, Chicago, St. Louis, Houston, Los Angeles.



Examples of "Pipe Prescription"
GRAHAM, ANDERSON, PROBST & WHITE
Chicago, Architects